

Flight, June 24, 1911.

FLIGHT

First Aero Weekly in the World.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

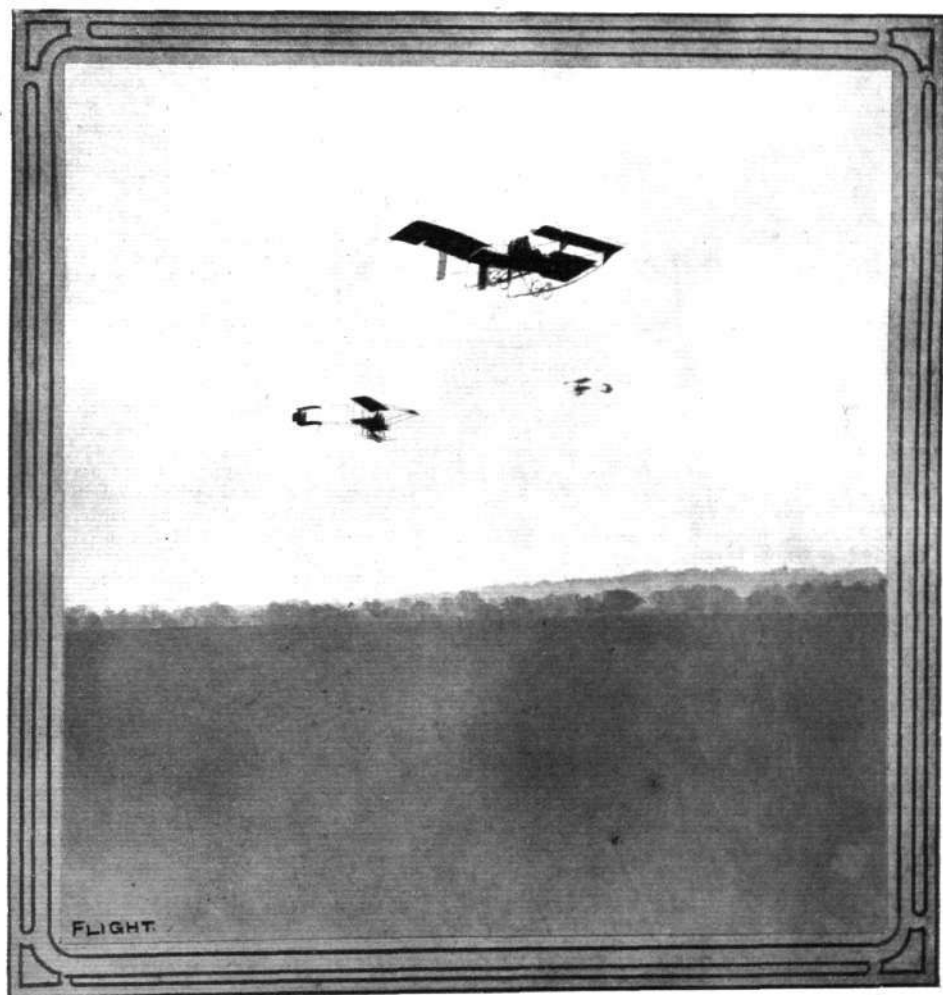
OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

No. 130. (No. 25. Vol. III.)

JUNE 24, 1911.

[Registered at the G.P.O.
as a Newspaper.]

[Weekly. Price 1d.
Post Free, 1½d.]



A trio in flight at the London Aerodrome, Hendon. Two Henry Farman's and, in the foreground, a Type A Valkyrie.

MISAPPREHENSION AND ITS DANGER.

IN a recent issue of the *Manchester Guardian* there appeared a leading article on the subject of the Aerial Navigation Act, which is full of misapprehension and false premises, but which is withal so moderately expressed that it is impossible to suspect the writer of anything but goodwill towards aviators and the movement generally. Therefore we can only ascribe its arguments to a want of exact knowledge of the situation, and of the true relations subsisting between the Royal Aero Club and those engaged in the development of the science, backed up by some very uncalled for comments lately made by a writer on aviation matters, and that almost seem to suggest personal pique against the Aerial Defence Committee.

Our Northern contemporary has nothing but praise for the Act, and is rather severe in its strictures on the attitude taken up by the Royal Aero Club and its leading supporters with regard to it. Taking as its text the parallel drawn by Lord Montagu and Mr. Roger Wallace between the Club and the Jockey Club, and the statement that the action of the Club would be a greater deterrent than any legislation, the *Guardian* calls it a fallacy, and lays it down that unless the Club recognises it for the error it is, it will be bad for the Club in the future. The Jockey Club, it continues, exercises beneficent control over the turf, but it cannot control the conduct of its members on the highways. It can stop any discreditable conduct on the part of its members on the course, but it cannot penalise a member for riding or driving to the danger of the public in the street. If it does penalise a member for anything done wrongly inside or outside a racecourse, the penalty extends strictly only within the limits of the Club itself. This, to begin with, is quite a fallacy, for the penalty extends a long way outside the strict limits of the Jockey Club itself. We should like our contemporary to tell us in what corner of the earth a person who has been "warned off" by the Jockey Club can run or ride horses at a race meeting. Surely the ban of the Jockey Club is a much more effective deterrent to the potential wrongdoer on the Turf than any legislation, which could only be local in its effect. Bringing the illustration nearer home, the *Guardian* has it that there is no ground for supposing that the fact of the Royal Aero Club suspending a flyer's certificate would have any effect on his pursuit of aviation, except the narrow one of debarring him from competitions in which he probably never intended to take part. On the contrary, the withdrawal of the Club's certificate would end, once and for all, the professional career of the offender, even as things exist to-day.

He could take no part in competitions the world over; he could not be employed as an instructor by any firm of aeroplane manufacturers for the very sufficient reason that none of his pupils would be licensed by the Club; and he would find himself a pariah and an outcast in the world of flight. And how much greater would be its power if it had the State behind it—though the *Guardian* says that that it can never have—even to the small extent of making it compulsory on all who fly to obtain the Club's certificate. Does it not seem that the Club would be in a far more powerful position of control than even the Aerial Navigation Act places the State itself? We think so, despite the arguments of our contemporary.

Again, we are told that the revolution in flying which

has taken place in the last ten months has radically altered the attitude of airmen to the Club and the Federation which it represents. The day of flying meetings is over, seemingly for good, and with them has gone the ability of the Club to control the rapidly increasing number of men who can fly. For ourselves, we can see no alteration in the attitude of the flying men towards the Club. Why should there be? The *Guardian* seems to be arguing from an entirely false premise, for it seems to think that the Royal Aero Club was in some way the cause or organiser of the circus-meetings which characterised the very earliest days of flying. That is an entirely wrong presumption, for the Club has never approved of such meetings, nor lent them more countenance than it was forced to do in order to retain the necessary control over promoter and aviator. The inference to be drawn from our contemporary's argument is that the day of the Royal Aero Club as a controlling body is past and done with, but so far from this being the case its real mission lies far more in the future than in either past or present. It would be as logical to argue that the day of the Royal Automobile Club as a governor is past, but all who know anything about automobilism know that this is very far from being the case. Even to-day, when the sport is in about as decadent a state as can be well imagined, people are extremely careful how they transgress the laws of the Club regarding, for instance, unauthorised trials.

Yet in the case of a newer movement, in which the officially-sealed trial must have a great bearing upon development, we are asked to believe that the loss of a certificate, which cannot be said to entail any social stigma, is no great matter! There the *Guardian* is most absolutely wrong in its facts. The loss of the Club's certificate is, on the contrary, the very worst thing that could befall the flying man, for at one stroke it deprives him of his whole ability to earn money as an aviator or to take part in competitions. The answer to this may be that as flying becomes more popular there will inevitably arise a class of wealthy amateurs who are prepared to spend money rather than to make it, and it is this class over whom the Club would have no control, because not being professionals they would not need the Club's certificate. There is a very effective counter to that argument, which is that if the Government had been willing to accept the assistance of the Club in controlling the use of the aeroplane to the extent of compelling every aviator to obtain the pilot certificate the same effective control could be exercised over the amateur as over the professional—a double control, in that the State could fine or imprison him what time the Club suspended his certificate. As it is, the Government, by rushing into panic legislation, will simply put the Club in a defensive position. It is the story of automobilism over again. Had the Government of the day chosen to avail itself of the co-operation of the R.A.C., the last road-hog would have been laid by the heels years ago, but as it is, legislation placed the motorist and his organisations in the position of potential defendants, who had to be keenly on the alert to preserve their rights and privileges on the highway, the net result being that even now the understanding between motorists and the constituted authorities is none too good. And that is the position to which any restrictive aerial legislation will lead in the case of aviation.

FLIGHT PIONEERS.



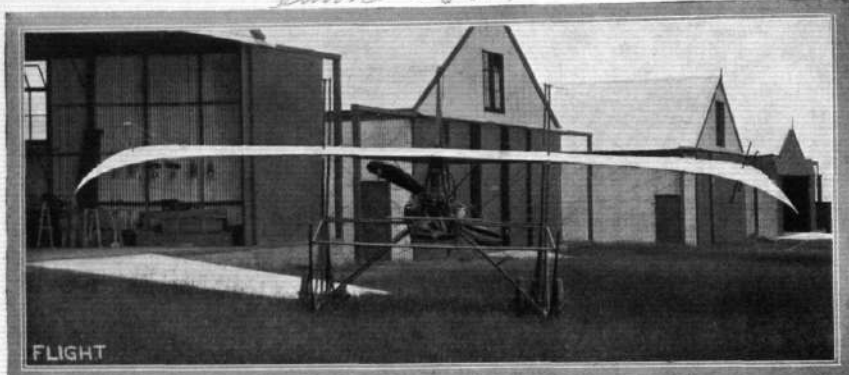
MR. JAMES VALENTINE.

THE DUNNE MONOPLANE, 1911.

As our readers are already thoroughly familiar with the general features of the Dunne system from our description of the biplane in *FLIGHT*, June 18th, 1910, it is unnecessary to make any elaborate reference to the monoplane that is now undergoing its trials at Sheppey. This machine, as a glance at the accompanying illustrations shows, has the same general type of wings, but a point that will escape casual observation is that the camber of each is generated on the surface of a cone having its apex in the vicinity of the trailing extremity, whereas it may be remembered that the generating cone used in connection with the wings of the biplane had its apex in the vicinity of

the prow of the machine. The meaning of this reference to the generating cone will be understood by those who read our

Dunne D63W



Front view of the Dunne monoplane.

"Flight" Copyright.



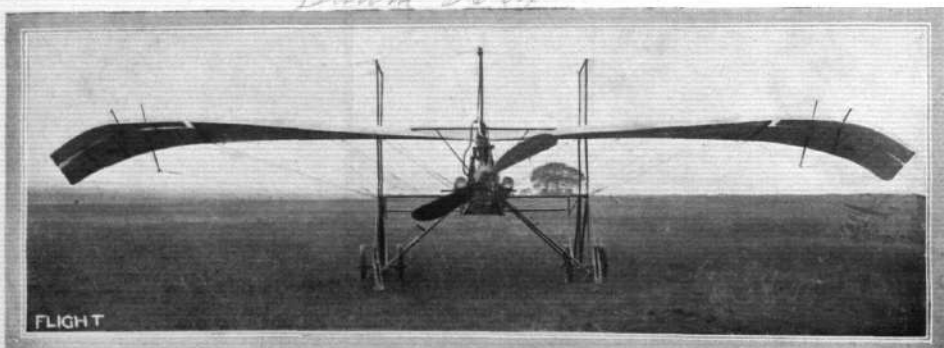
Side view of the Dunne monoplane.

"Flight" Copyright.

description of the Dunne biplane, but for the sake of those who are unfamiliar with the principle, we may briefly explain that the characteristic feature of the Dunne wing formation is that the camber changes from point to point between shoulder and tip. This change takes place both in camber and attitude (angle of incidence) and is gradual in character; it is represented by the change of curvature on the surface of a cone arranged in a special way with respect to the setting of the wings. For a complete explanation of this particular

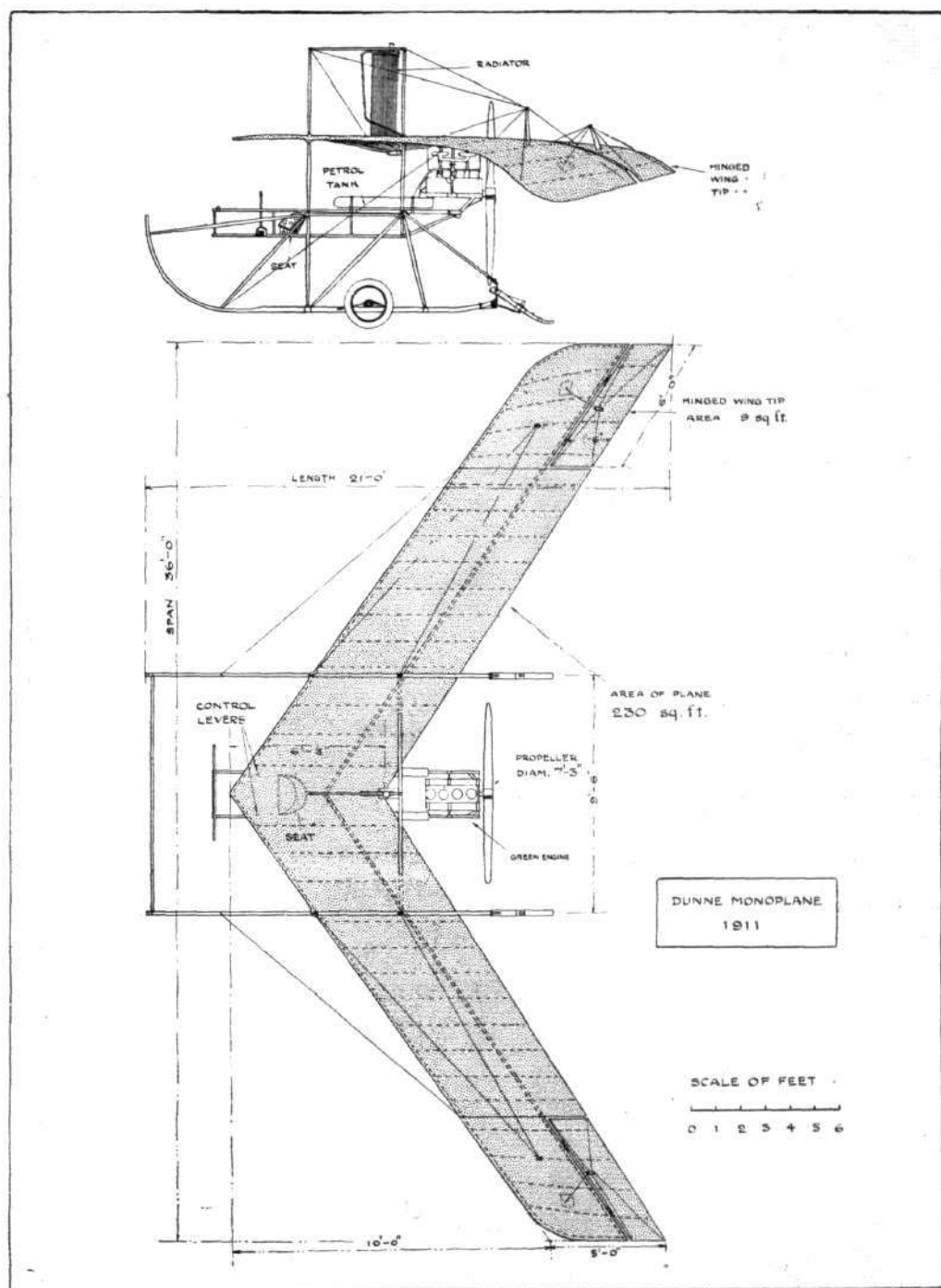
0156

Dunne D63W



Rear view of the Dunne monoplane.

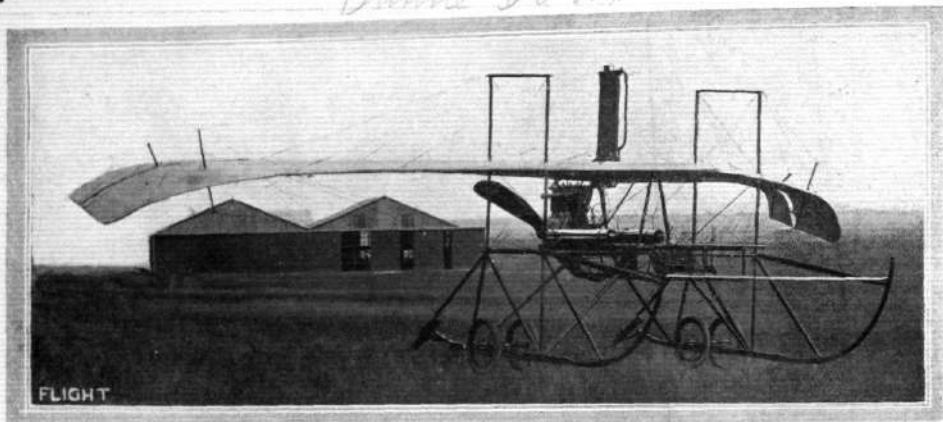
"Flight" Copyright



THE DUNNE MONOPLANE, 1911.—Plan and side elevation to scale.

"Flight" Copyright.

Dunne D 6 Box



Three-quarter view of the Dunne monoplane from in front.

"Flight" Copyright.

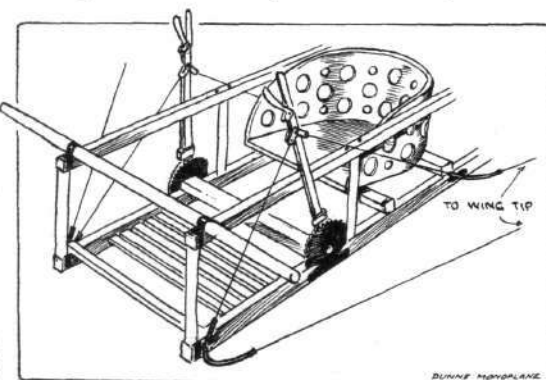
point, however, we must refer our readers to our above mentioned article.

Since the tips are set back behind the shoulder, owing to the V plan form of the wings, the change in angle between shoulder and tip introduces the principle of the longitudinal dihedral. In order to render this clear it is convenient to imagine that the middle section of each wing is removed. In this case the extremities form two tails at a negative angle in respect to the leading main plane. In practice the extremities act as tails, and being out of the influence of the draught of the propeller they do not tend to disturb the balance of the machine if the propeller stops in flight. As to where the tail portion begins and the main plane ends, it seems impossible to say, for it seems only reasonable to suppose that the dividing line varies with circumstances. Provided that it moves in the right direction, this differential action is, of course, all to the advantage of the natural stability of the machine.

Natural stability is the great aim, we might almost say the *raison d'être*, of the Dunne aeroplane, and, so far as the longitudinal stability is concerned, the simple principle of the fore and aft dihedral is apparently a sufficient explanation of the system. In many modern machines the principle of the dihedral is also used for lateral stability, but in the Dunne machine this equilibrium is arranged in a different way. As a glance at the accompanying illustrations shows, the wings are arched rather than upturned, and it is therefore to the principle of the gull's wing, and not to the dihedral angle, that the lateral stability of the machine is due.

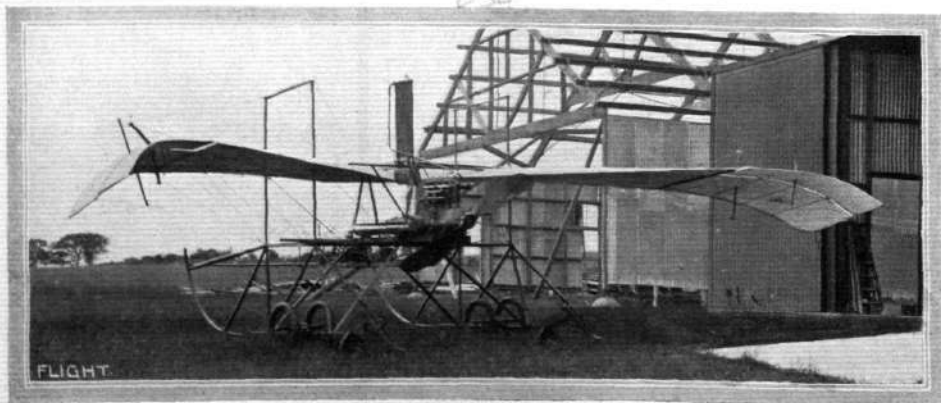
Unfortunately, this principle does not lend itself to any very precise explanation, but as a general description it may be pointed out that the down-turned extremities are so arranged that if the

relative wind veers from an initial position, which may be assumed to be in the line of flight, the near wing will be partially shielded and may even have a downward pressure on its extremity. Simul-



"Flight" Copyright.

Sketch illustrating the pilot's seat and two control-levers on the Dunne monoplane.



Three-quarter view of the Dunne monoplane from behind.

"Flight" Copyright.

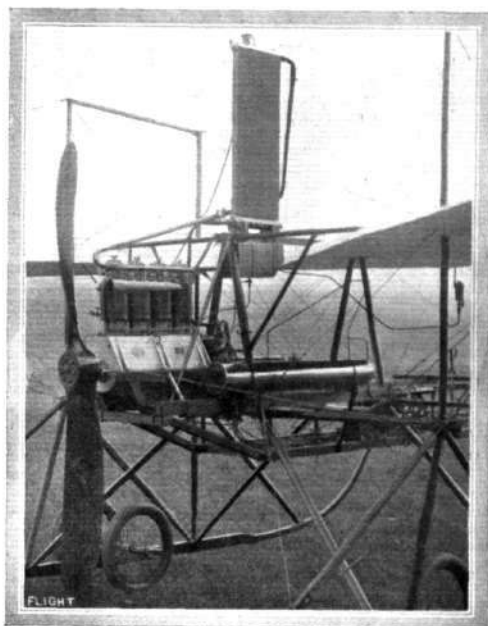
taneously, the downturned extremity of the far wing will be more exposed and will thus exert a greater lifting force at its full leverage.

The first tendency of the veering wind is to lift the near wing, owing to the improved aspect ratio of that wing and to the diminished aspect ratio of the far wing, which is also possibly shielded somewhat by the body of the machine; it is this disturbing force that is counteracted in the manner just explained. As the equilibrium of the machine depends on the nicety with which one force just balances another it can be understood that the exact design of the wings is rather a difficult matter.

It will be observed, from what we have said, that the disturbance and correction thereof are simultaneous and are both brought about by the relative wind itself, without change in the position of the machine. In the theory of the dihedral angle, the machine is assumed to heel over in order to obtain a righting force. This difference in the actions of the two types of machine seems to draw a line between two types of stability, which may be described as "stiff" and "rolling." The Dunne principle belongs to the former, inasmuch as the machine is not supposed to be actually moved at all by the disturbing influence.

From a structural point of view, the Dunne monoplane is mainly interesting on account of its dissimilarity in general appearance to any other well-known type. The wings form a canopy over the pilot, who is seated in the bows of a shallow body that carries the engine at its after end. The propeller revolves immediately behind the V of the wings, and its axis is, of course, in line with the centre of gravity of the machine. Above the wings is the radiator, which is placed there principally to raise the centre of gravity as high as possible. The entire machine is carried on a simple wheel-skid under-carriage.

The control of the machine is effected by two levers, which are quite independent, and control the hinged wing-tips in the trailing edges of the planes separately. These flaps serve the dual purpose of elevator and rudder, for when they are both moved simultaneously in the same direction they alter the attitude of the machine, and thereby cause it to climb or descend; but when moved in opposite directions, or when one of them is moved alone, it is equivalent to rudder action, because it alters the resistance to motion and thus tends to accelerate or retard that extremity of the plane, so that the machine alters its course.



"Flight" Copyright.

Engine and propeller on the Dunne monoplane.

AERO MODELS ASSOCIATION.

THE following is a statement that we have received from the Secretary of the Aero Models Association under cover of a letter explaining that the same document has been sent to all the Clubs and organisations interested in aero model flying with the request that they should favour the Association with observations thereon.

The text of the circular is as follows:—

The Registration of Aero Models.

General interest in the construction and flying of aero models has led to the rapid establishment throughout London and the provinces of numerous clubs and societies, having for their objects the encouragement of the study of the laws of aerodynamics by means of experiments with aero models; and also the encouragement of the flying of aero models as a pastime.

As a natural sequence, the feeling is being very widely expressed and the need has arisen, and is now becoming urgent, for a central association for the registration of performances of aero models.

The Aero Models Association is an organisation formed to deal exclusively with the design, construction and flying of model aerial machines and all things pertaining thereto. As a branch of the Aviation Section of the Automobile Association and Motor Union—an organisation of influence and repute with representatives throughout the whole of the United Kingdom of Great Britain and Ireland—and in view of its having been consulted with reference to the organisation of aero model competitions, and having received suggestions that it should take the lead in the matter of the registration of aero models, it deems itself justified in placing before the various organisations of the United Kingdom the following propositions for dealing with the registration and the issue of certificates of performances of aero models:—

1. The Aero Models Association declares itself prepared to undertake and keep an impartial record of the performances of aero models and to issue certificates in connection therewith.

2. The Aero Models Association proposes to extend its Committee by inviting all clubs and organisations interested in aero models to nominate members thereto, for the consideration of all matters pertaining to such registration. The Committee so formed to have power to make such regulations as they think fit as to the summoning

and holding of their meetings and for the transaction of business thereat, and they may adjourn any meeting.

3. Representation on the Committee shall be at the rate of one representative for every organisation with a membership exceeding fifty (50) and not exceeding one hundred (100), and one representative for every additional 100 members or portion of 100.

4. The qualifications of the appointment of representatives shall be:—

- a. Membership of at least fifty (50) subscribing members.
- b. Allegiance to the rules of the Committee.

Each club or organisation must be duly elected by the representative Committee.

5. This Committee duly constituted shall be considered the paramount body governing the sport and pastime of aero model flying.

6. Representatives on the Committee shall not be directly interested in the commercial side of the construction of aero models.

7. The functions and objects of the Committee shall be limited strictly to the consideration and promulgation of rules and regulations governing the flying of aero models and for the settlement of any question of dispute referred to them for settlement by any body or organisation interested in aero model flying; the approval of all proposed aero model competitions; general encouragement and experiments with aero models as far as is possible by any of the above means.

Taking advantage of the open-minded request in the covering letter to the above document, we should like to point out the possible misunderstanding that might arise through misinterpretation of the Association's intentions as outlined in the opening paragraph. It is quite clear that the Aero Models Association intends to try and become the governing body affecting the sporting side of model flying. It is, however, necessary to bear in mind that models are often used for serious scientific study and may become still further employed for this purpose. In so far as they are used in this sense, they come within the scope of a body of the character of the Aeronautical Society, and we should, therefore, like to suggest a modification of the words "encouragement of the study of the laws of aerodynamics" in the above mentioned first paragraph, in order to avoid any apparent clashing of interests.

REPORT OF THE ADVISORY COMMITTEE FOR AERONAUTICS, 1910-II.

As explained in our previous issue, the Report of the Advisory Committee this year is separated from the technical report, which has not yet been published. This general report is of a very abbreviated character in itself, and the following abstracts therefrom give the gist of the information that it contains.

Resistance and Directional Stability of Airship Models.—Perhaps the most interesting investigation is that on airship models. The work has been directed to the determination of the head resistance for motion parallel to the axis, the "lift" and "drift" for motion oblique to the axis, the magnitude of the moment tending to increase the obliquity—called hereafter the negative righting moment—when the ship is at different angles to the relative wind, and the amount of fin area necessary to give a positive, in place of a negative, righting moment.

The work has been carried out in co-operation with the Superintendent of the Army Aircraft Factory, who provided the models for the tests, the head and tail curves for which were systematically varied according to a plan devised by him. The object of the tests for head resistance was to determine the amount of change in resistance due to specific alterations of the curvature in head or tail, and ultimately to determine the forms of minimum resistance for a given gross lifting power and for a given net lift. The experiments led to the adoption of certain curves for head and tail, with a ratio of total length to maximum diameter of about 6:1.

Results of practical importance have been obtained in the determination of the negative or positive righting moments acting on models of airships of different forms. If an elongated model of the customary fish-shaped form be supported in a current so that it can turn about an axis through its centre of gravity, it tends to set itself at right angles to the current; when it is oblique to the current a moment acts on it tending to increase the obliquity.

The next step was to find the amount of fin area necessary, and the best position for the fins, to give a positive in place of a negative, righting moment. It was found, even with a considerably elongated tail, that if the fin were placed towards the rear of the tail and close to the body the portion of the fin nearest the body was comparatively inactive, owing to the slow movement of the stream in this region. This slow motion of the stream near the tail was confirmed by photographs taken to investigate the nature of the flow past fish-shaped models.

Air Resistance of Wires and Ropes.—The air resistance of the stranded ropes, per unit of the sectional area exposed to the wind, is found to be of approximately the same amount as that for small square plates. No great difference was found between wire ropes and hemp ropes at the same velocity. In the case of smooth wires the resistance per unit of sectional area is appreciably less, the difference being of the order of 20 per cent.

Experiments were also made on the air resistance of vibrating wires; no appreciable effect on the air resistance was found at the vibration velocities reached, whether the wires were made to vibrate in a plane parallel to the direction of motion, or perpendicular to it. It may be inferred, therefore, that in practice the air resistance of wires can be calculated on the basis of the values given for stationary wires in the table printed in the account of these experiments given in the Technical Report.

It is of interest to note that the values found at the National Physical Laboratory are in close agreement with the results obtained, also during the past year, for the resistance of stationary wires and ropes, at the well-known aerodynamical laboratory at Göttingen under the direction of Professor Prandtl. The work on airship models, and the results for the resistance of inclined plates, are also in general accordance with the observations of a similar character which have been made at Göttingen.

Wind Resistance of a Radiator of Honeycomb Type.—Experiments have also been made on the wind resistance of the honeycomb form of radiator. For the purpose of these tests a scale model was made, and its resistance compared in the wind channel with that of a solid block of the same external dimensions. The conclusion was that the wind resistance of such a radiator in which the net area is about 25 per cent. of the total area is approximately one-half that of a flat board of the same dimensions.

It was considered of some interest to determine also the velocity of the air flow through the tubes of the honeycomb, and its variation with the length of the tube. In these experiments the tubes of the actual radiator were employed, and with a tube length of about four inches the wind velocity in the tube was found to be about three-fourths of the mean wind velocity outside. Reducing the length of the tube by one-half produced an increase of only about 15 per cent. in the air velocity through the tube.

The general conclusion was that the honeycomb form of radiator

is fairly efficient, and it does not appear that any considerable increase in efficiency can be obtained by diminishing the length of the tubes, or by increasing the ratio of diameter to length beyond the value, viz., 1:12, which obtained in the type tested.

Other Tests in the Air Channel.—In experiments on a model of the girder designed by Fabre and used in the new type of Paulhan aeroplane it was found that the efficiency of the girder, regarded as a small biplane, was about 50 per cent.

Friction of Air in Pipes.—Among the reports included in the Technical Report is a preliminary communication by Dr. Stanton of some results obtained for air friction by means of experiments on the flow in pipes, in which the effect of changes in the dimensions and roughness of the pipes is discussed. Some of the pipes tested were artificially roughened by cutting right and left handed screws along the inner surface of the pipes, of pitch and depth proportional to the diameters. It is interesting to note that the dimensional relation for these artificially roughened pipes is precisely similar to that found by Messrs. Bairstow and Booth in their examination of the experiments on the normal resistance of flat plates of different sizes.

Whirling Table and Propeller Tests.—With a view to reaching as high an accuracy as possible in the future tests, especially at the higher speeds of translation, a careful study has been made of the motion set up in the air of the whirling table shed by the rotation of the whirling arm. As a result of the experiments it was found that when the end of the arm was travelling at a speed of 35 miles per hour the mean velocity of the air in the shed at the boundary of the circle described by the arm was about two miles per hour while the velocity of the air into which the arm was entering was 1.6 miles per hour. The air velocity was also found to be approximately proportional to the arm speed. The second figure gives the air swirl correction to the arm speed at 35 miles per hour required for the purpose of the propeller tests. In all future tests a direct determination of the swirl velocity will be made and the necessary correction applied.

Effect of Blade Area on Propeller Efficiency.—At the request of Captain Suter a series of tests was made to determine the effect on propeller efficiency of varying the width of blade. The tests were made on model propellers designed and supplied by Messrs. Vickers, Limited, whose representative visited the National Physical Laboratory for a few days in order to take part in the work. Messrs. Vickers were also good enough to furnish the results of tests made at Barrow on a full-sized propeller, in order that these might be compared with the results of the small model experiments made at the Laboratory.

For comparison with the full-scale results, a test was first made on the corresponding model propeller at a speed of translation having a ratio to the test speed of the full-sized propeller equal to the ratio of the square roots of their linear dimensions. It was found that, for the same slip, the thrust and efficiency given by the model experiments differed only by a small amount from the values they should have as deduced by calculation from the full-scale tests. The experiment is important from the point of view of the prediction of full-scale results from small model tests, but the work so far done is not sufficient to justify any general conclusion as to the validity of the "model" law which proved in this instance to be correct. It is hoped that further comparisons may be carried out shortly.

The further tests on the series of models were made at the speed of translation suggested by this preliminary work, and by reducing the width of blade from that used in the above experiment an increased efficiency was obtained. It was found that the maximum efficiency was reached at a disc area ratio of approximately .19.

Other Propeller Tests.—A series of tests has been made for the Superintendent of the Army Aircraft Factory on some Ratmanoff propellers to the design of M. Drzewiecki, who also paid a visit to the Laboratory. As is well known, the aim in the design of this propeller is that each element of the blade should strike the air at the same angle of maximum efficiency, the propeller being run at a definite ratio of translational speed to speed of rotation. The maximum efficiency reached with any of the propellers tested, at the propeller speeds attainable at the time when the tests were made, was 67 per cent., at a speed of translation of about 30 miles per hour.

Tests on Motors for Aeronautical Purposes.—In January of the present year the Committee were informed by the Aerial League that Mr. Alexander desired to offer a second time a prize of £1,000 for an aeronautical motor, to satisfy conditions generally similar to those laid down for the previous competition; the competition on this occasion to be for engines of somewhat higher horse-power, and not to be restricted to motors of British manu-

fracture. The Aerial League again asked the assistance of the Committee, and in view of the great value of such comparative tests, both in connection with aeroplanes and dirigibles, the Committee agreed as before to carry out the trials, and to report the results to a Joint Committee of the Aeronautical Society, the Royal Aero Club and the Aerial League.

The conditions for the tests were drawn up by the Committee in conjunction with Mr. Alexander, and were issued in March. The entries will be completed by the end of June, and the tests will be commenced early in October of the present year.

Strength Tests on Fabric.—Experiments to determine the effect of varying the rate of loading have been made, and it was found, for a particular fabric, that the ultimate strength found by rapid loading was about 14 per cent. higher than that found by slow loading. The rate indicated above as that now employed is practically equivalent to a dead slow rate.

The existence of the speed effect just mentioned suggested the probability of a fatigue effect, and this question was also investigated. With the method finally employed it was found that the strength of the particular fabric tested to withstand repeated applications of stress was about 11 per cent. lower than the strength taken on a single specimen loaded to rupture.

Bursting Tests.—Difficulties were originally found in making bursting tests owing to the fact that most of the earlier cylinders tested broke at the joint. Finally a cylinder of diagonally doubled material was obtained which did not burst at the joint and which broke at very high stresses. Damage done in this test led to the redesigning of the apparatus, and in the new apparatus arrangements have been made to enable the cylinder to be subjected to longitudinal tension in addition to internal pressure.

An account is given in the Technical Report of an interesting series of tests carried out with this apparatus. In these tests the ratio of the circumferential to the longitudinal stress varied from 2 : 1, corresponding to a pure bursting test, to 0 : 1, corresponding to a pure tension. The tests appeared to indicate that the strength in warp or weft is approximately independent of stress applied in the direction at right angles. The behaviour of fabrics under various ratios of compound stress is being further examined by a graduated series of tests on a number of bags of a specially selected fabric.

In the above tests it was found that bags of parallel doubled material and of the same material diagonally doubled appear to be of nearly the same strength for a 1 : 1 ratio of stresses, while the tensile strength of the latter determined in the usual way is only half that of the former.

An account is also given by Mr. O'Gorman in the Technical Report of a large number of bursting tests carried out at the Army Aircraft Factory on a variety of fabrics. The object of these tests was to obtain a comparison with the ordinary tensile tests. The results showed that, on the average, the bursting tests on parallel doubled rubbered cotton gave results a little higher than the tension test, while for diagonally doubled fabrics the mean of the bursting test was about 1½ times as great as the tension test. For single oilskin the bursting test gave a slightly lower figure than the tensile.

Tearing Tests.—Some tests have been made to determine the effect of a small wound in the fabric on its strength, with a view of indicating, if possible, the factor of safety necessary to ensure that such a wound or tear shall not immediately spread. The disturbance of stress distribution caused by such a wound is accommodated within a large but finite area of the fabric, which may be called the "danger rectangle." It was expected that the applied stress causing rupture of a specimen containing a relatively small cut of fixed magnitude would be independent of the dimensions of the specimen provided it were at least as large as the "danger rectangle"; and the results obtained were in agreement with this theory. The necessary factor of safety for wounds of different sizes was given, for the particular fabric tested, as the result of these experiments. The work was limited to wounds of small size, which would, however, include ordinary bullet holes; apparatus is under construction to enable the work to be extended to wounds of larger dimensions.

Permeability Tests.—A large number of rubbered and other fabrics have now been tested for permeability by hydrogen.

In the case of rubbered fabrics, the permeability is found to be more or less directly dependent on the quantity of rubber employed; the lighter rubbered materials show a higher permeability, a number of samples tested exceeding the maximum of 10 litres per square metre per 24 hours usually allowed in French specifications. This is especially the case with the parallel doubled cloths examined, and

the work done points to the superiority of diagonal doubling from this point of view. The permeability of rubbered fabrics increases rapidly with rise of temperature, the increase being as much as 9 per cent. per degree centigrade in the samples tested.

Samples of oilskin, varnished silk, and of other fabrics proofed in various ways have also been tested for permeability. The exact nature of the proofing is not in all cases known. Some of these have shown excellent qualities as regards their hydrogen holding capacity, the permeability in many of the samples being less than 1 litre per square metre per 24 hours, and in some instances not exceeding a quarter of this amount, with a less weight than that of the lighter rubbered fabrics above referred to. In some of these fabrics the hydrogen holding capacity appeared to improve with rise of temperature.

Tests have also been made on a number of samples with joints. In the rubbered fabrics tested, and in some of the others, the permeability of the joint was no higher than that of the rest of the fabric, but with proofing other than rubber the joint has sometimes been found to have a much higher permeability. This is a point, therefore, to which attention must be paid. The joints have also sometimes shown a deficiency in tensile strength.

Weathering Tests.—The rate of deterioration was usually found to be most marked during the second month of exposure. Thus for one fabric the losses in strength in the first three months of exposure were approximately 9, 28 and 10 per cent. and similar figures have been obtained for other fabrics.

The effect of the usual yellow protective colouring is considerable. In several uncoloured samples after 50 days' exposure in the open the hydrogen leakage has been found to exceed 100 litres per square metre per 24 hours. A number of yellow fabrics, however, which have been exposed for some five or six months are still moderately gas-tight; and further, as regards tensile strength, are only a little weaker than the unexposed samples. From the more recent tests, it appears that sunlight is the most important factor in producing deterioration.

On the other hand, the oilskins, varnished silk, &c., tested have not in general shown any appreciable increase in permeability with exposure. If taken down for test on a warm day their hydrogen holding capacity has often been found to have improved. In some cases where a sample has shown deterioration, it has again improved after further exposure, the temporary increase in permeability being probably due to crumpling when cold.

Light Alloys.—Samples of "Duralumin" have been supplied by Messrs. Vickers, Ltd., and the mechanical tests made on these were in general agreement with the results found at Barrow. Samples of channel bar tested at the National Physical Laboratory gave a tensile strength of 25·7 tons per square inch, and samples of wire 30 tons. Further investigation of this alloy will be undertaken. Some of these at present being studied in connection with the work for the Alloys Research Committee of the Institution of Mechanical Engineers are showing very promising results, tensile strengths up to 34 tons per square inch having been obtained, together with reasonable ductility, and without recourse to special thermal treatment.

Meteorology. Rotary Motion in the Air.—The observations do not support the idea that eddy motion is the cause of the gustiness of the wind.

Some interesting particulars are given in Mr. Dines' report of comparisons between simultaneous records of velocity obtained on this anemometer and from a standard anemometer mounted on a house at a distance of 150 yds. As was anticipated from the work of previous experimenters, the individual gusts were not, as a rule, in agreement on the two records, but it is surprising to find that in certain cases squalls of five minutes' duration recorded by the anemometer on the house did not appear at all on the 98 ft. record. A possible explanation of these differences is that an increase of wind velocity of as long as five minutes' duration may be confined to quite a narrow belt.

Gustiness of the Wind.—The mean gustiness found at altitudes from 500 to 1,000 ft. was 60 per cent. of the gustiness from 0 to 500 ft. Above 1,000 ft. no certain rule can be deduced from the observations. Easterly winds gave uniformly high gustiness factors; the anemometer at Pyrtan Hill, where these records were obtained, is situated at the foot of the western slope of the Chiltern Hills, so that the gustiness of this easterly group of winds may be due to the previous passage of the air over the range. The decrease of gustiness with height does not appear to be dependent upon direction to any noticeable extent.

✧ ✧ ✧ "Clement Bayard IV" Cruises High.

QUITE a lengthy trial was indulged in with the airship "Clement Bayard IV" on the 13th inst., when she was out for three hours and a half during the morning, and with ten persons on

board cruised over Compiègne and Soissons, attaining an altitude of 1,500 metres. On the 16th inst. it was out for over an hour and carried twelve passengers, including M. Clement, Commandants Boyer and Labadie, and Capt. Detouche.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

GORDON-BENNETT AVIATION CUP.

THE race for the Gordon-Bennett Aviation Cup will take place at the Royal Aero Club Flying Grounds at Eastchurch, Isle of Sheppey, on Saturday, July 1st, 1911, and is timed to start shortly after 11.30 a.m.

Representatives from the following countries will compete:—America, Austria, France, Germany, and Great Britain. The race is over a distance of 150 kilom., roughly 94 miles, and will be on a circuit of about 3 to 4 miles.

Railway Arrangements.—A special train at reduced fares will leave Victoria (South Eastern and Chatham Railway) at 9.30 a.m., calling at Herne Hill at 9.40, and arriving at Eastchurch at 11.10.

Admission of Members.—Members of the Club will be admitted free to the members' enclosure on production of their membership cards. These facilities apply to members only, and any friends accompanying them must pay for admission. The price of admission to the members' enclosure is 5s., and members can now purchase tickets from the Club for admission of their friends.

Motor Cars.—An enclosure will be specially reserved for motor cars, giving an uninterrupted view of the whole Race. The charge for motor cars, including the driver, will be 10s. per car. It would greatly facilitate the arrangements if members purchased tickets for this enclosure beforehand so as to avoid any delay on entering the private road leading to the Aviation Ground.

Refreshments.—Arrangements have been made with the Army and Navy Stores, who will erect large marquees, where luncheons, teas, and other refreshments can be obtained.

Dinner to the Competitors.—It is proposed to give an informal dinner to the competitors at the close of the race, when the cup will

be presented to the winner. This dinner will be held in a special marquee erected on the ground, and tickets, 5s. each, can now be obtained from the Club. In order to meet the convenience of those members returning by rail, a special train will be arranged to leave Eastchurch after the dinner.

Members are particularly requested to purchase tickets beforehand so as to facilitate the arrangements.

Balloon Race at Hurlingham.

The Perimeter Race, for the cup presented by Mr. A. Mortimer Singer, will take place at the Hurlingham Club, Fulham, S.W., on Saturday, the 24th inst.

The following entries have so far been received:—

Entrant.	Balloon.	Pilot.
Mrs. John Dunville ...	"St. Louis"	C. F. Pollock.
John Dunville ...	"Banshee II"	John Dunville.
Hon. Mrs. Assheton Harbord	"North Star"	Griffith Brewer.
Consul Stollwerck ...	"Hannover"	Consul Stollwerck.

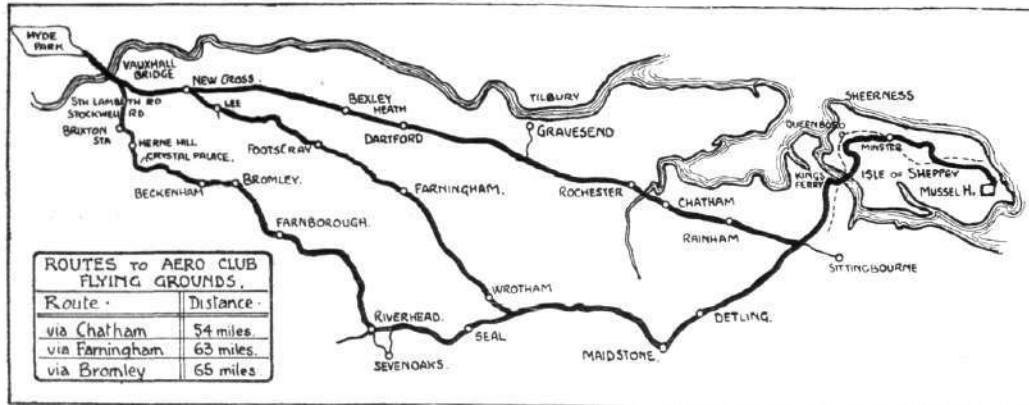
Members of the Royal Aero Club will be admitted to the Hurlingham Club free, on presentation of their Royal Aero Club membership cards.

Members of the Royal Aero Club can obtain, from the Secretary of the Royal Aero Club, special vouchers for the admission to Hurlingham of their friends, who are not members of the Royal Aero Club. These vouchers will admit on payment at the entrance gates.

The Manville £500 Prize.

The sixth date for this competition is on Saturday, the 24th inst.

HAROLD E. PERRIN,
166, Piccadilly. Secretary.



PROGRESS OF FLIGHT ABOUT THE COUNTRY.

NOTE.—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary. We would ask Club Secretaries in future to see that the notes regarding their Clubs reach the Editor of FLIGHT, 44, St. Martin's Lane, London, W.C., by first post Tuesday at latest.

Brighton and District Aero Club (41, PRESTON ST., BRIGHTON).

The first meeting of the club was held on Thursday, June 8th, and was a great success. Officers and committee were elected and rules and regulations drawn up. A large workshop has been found and is now being thoroughly fitted up for the use of the members. Any person who is interested and who would like to become a member should communicate with the hon. sec., Mr. C. Barnett.

Sheffield Model Aero Club (35, PENRHYN ROAD).

A GENERAL meeting of the above club will be held at "Staniland's" Restaurant, West Street, on June 28th, at 8 o'clock p.m. All those interested and wishing to become members should attend. Some very interesting business is down for discussion, also some model aeroplanes will be on view. All members are requested to

be present. All communications should be made to the Secretary, C. F. W. Cudworth, 35, Penrhyn Road.

SCHOOL AERO CLUB.

Arundel House School Ae.C. (15, ARLINGTON ROAD, SURBITON).

ON Whit Monday R. F. Mann, flying the Mann monoplane No. 40 at the Hook Aerodrome, raised the club duration record to 74 secs., thus beating the 70 secs. record previously held by him. It will be remembered that this machine recently flew a distance of nearly 2,000 ft.

Members of the club have now been awarded no less than 21 prizes in public competitions, 9 of which have fallen to R. F. Mann and 6 to Cyril Ridley.

The club is organising an open model flying meeting in July, of which full details will be published shortly.

FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Flying Ground, Eastchurch.

MOST of the machines at Eastchurch were out during the week, including the Dunne monoplane and the Baby Wright.

On Thursday evening, Lieut. Samson started on the Short No. 38 for Brooklands, where he landed after making a break for the night at Salfords, near Horley. There was a rather choppy wind blowing when Lieut. Samson started, but being confident of his machine, he had no compunction about starting, and got away well at 5 p.m., being soon lost to sight under a great bank of clouds lying to the south-west.

Soon after Lieut. Samson had started, Mr. Ogilvie brought out the "Baby" Wright which was thus seen flying for the first time since its arrival here.

After a flight of a few minutes only, Mr. Ogilvie descended on a rather rough patch of ground, and the landing gear, apparently not being able to stand the strain, collapsed with the result that the machine was considerably damaged. This mishap clearly shows the necessity of having a strong landing chassis, a point which is of quite as much importance as that of manœuvring whilst in the air.

The interesting Dunne monoplane was also flying on Thursday evening, and showed considerable speed, which, at a rough estimate, must have been some 65 m.p.h. Although only short flights were made the machine appeared to have plenty of buoyancy, and could undoubtedly have made longer flights, and this with only a small Green engine. No one, however, can blame the inventor for proceeding cautiously at first with a machine the design of which is entirely new.

Mr. Jezi was not flying during the week, possibly owing to his being fully occupied on a new machine which he has now in course of construction. The advent of this machine, which is cleverly designed and of miniature proportions, will be watched with great interest at Eastchurch.

Brooklands Aerodrome.

DURING last week very little flying was possible. Mr. Percival early one morning managed to get over a circuit on the Billings

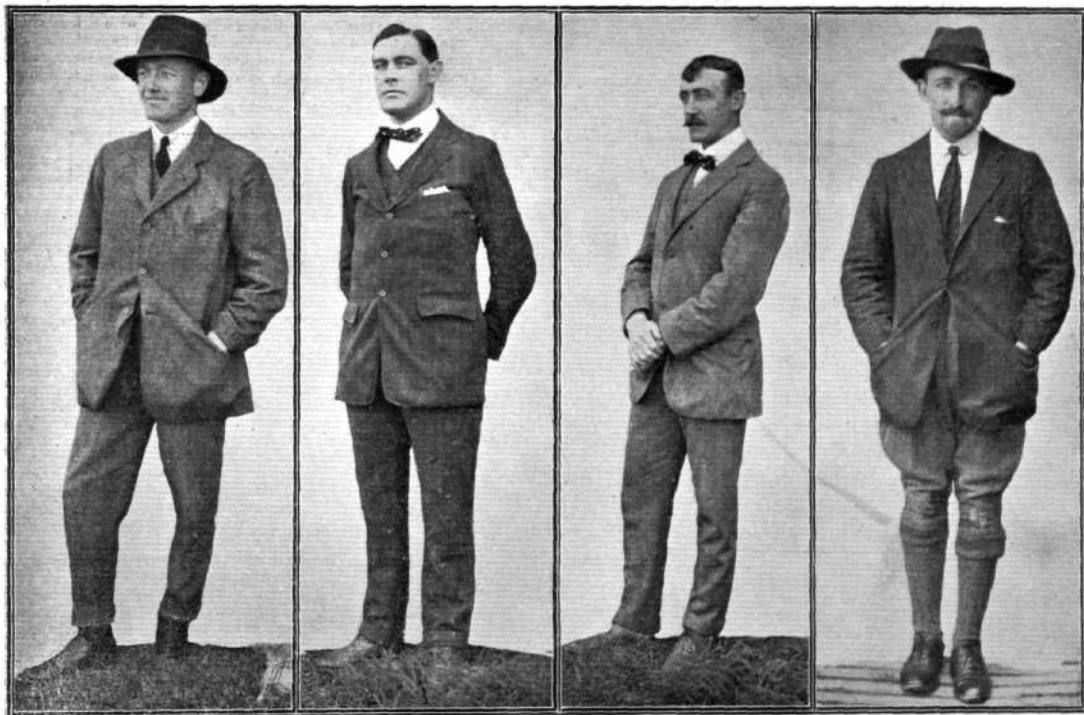
biplane at a height of about 100 feet. On Sunday, 11th, Mr. Raynham was busy passenger carrying, while Lieut. Snowden-Smith and Mr. Pixton put in some good work. Mr. Roe has a new machine of the Curtiss type which is expected out shortly. The rhomboidal biplane is expected to be out during the course of the next few days, a Green engine having been fitted. Martin-Handasyde have also fitted a new engine, a 60-h.p. Antoinette, to the monoplane they built to the order of Mr. Sopwith. It is expected that this machine will be exceptionally fast.

On Wednesday, Mr. Radley was out for the first time on the Antoinette. Unfortunately being used to the quick Blériot control he landed rather heavily and broke a wing spar.

On Thursday morning Lieuts. Barrington-Kennett and Reynolds, on a Bristol, flew over from Salisbury Plain, arriving at Brooklands at 6.15 a.m. As they took 2½ hours over the journey the Army Air Battalion is evidently not afraid of early rising. Mr. Pixton was out on the Bristol in the evening, in spite of a puffy wind. Mr. Radley was again trying the Antoinette, but only ventured on straight flights. Lieut. Barrington-Kennett brought out his machine, but evidently did not seem to fancy the Brooklands *remous*.

On Friday morning Lieut. Samson, R.N., arrived on his Short biplane. He had started from Eastchurch the preceding evening, slept under his machine at Horley, and eventually arrived at Brooklands at 11.30, after having lost his way, and landing at Hawthorn Hill to inquire his whereabouts. Brooklands *habitués* were much impressed by the workmanlike appearance of the Short Bros.' machine.

On Saturday morning Mr. Cody arrived at 6.30. A high wind was blowing all day and not much flying was possible. Mr. Pixton made two good flights, winning the Aggregate Time Flight Competition. Mr. Fisher had the Hanriot out for the first time since Jack Humphreys' accident, but owing to an unsuitable propeller, was only enabled to make straight flights, although the machine seemed remarkably steady in such a strong breeze. Lieut. Longmore went for a circuit or two on the Short biplane, and Mr. Cody made a short flight, as on previous occasions, carrying a passenger standing 10 ft. out on the plane, which apparently made no difference



"Flight" Copyright.

Lt. A. M. Longmore, R.N. Lt. Reginald Gregory, R.N. Lt. Eugene L. Gerrard, R.M.L.I. Lt. C. R. Samson, R.N.
The quartette of Naval Lieutenants, specially selected by the Admiralty, who qualified for their aviator-pilot's certificates so rapidly at the Royal Aero Club's Eastchurch flying grounds, under the masterful tuition of Mr. G. B. Cockburn.

to the stability of the machine. Mr. Radley unfortunately, during the day, completely wrecked the Antoinette. The machine was caught in a bad gust, and Mr. Radley, in correcting the list, apparently overwarped, and came down heavily on one wing. Mr. Radley was unhurt, which fact again demonstrates the advisability of strapping oneself into the seat. Mr. Raynham and Lieut. Snowden-Smith also made short flights. Late in the evening, Mr. Jenkins brought out the Avro-Curtiss type machine, and did a little rolling practice. This machine must be rather trying for the nerves, as, according to Mr. Jenkins, the controls have very little effect.

On Sunday the wind was too boisterous for any attempt at flying. **Avro School.**—Both S. V. Sippe and S. V. Setti, two new pupils, who, although they have in several ways similar names, are no relation to one another, were making straight flights.

On Thursday morning and evening Stanley Adams flew several times round the track, and he intends going for his certificate at the first opportunity, as he has done figures of eight several times at a height of 300 ft. Ronald Kemp gave a good display of quick rising and gliding. Both Lieut. Blacker and Mr. Hunter are doing steady straight flights and their landings could not be better.

Friday was rather gusty. Messrs. Hunter, Sippe, Setti and Stanley Adams were all out doing very well for their respective amount of experience.

Saturday turned out very windy. Conway Jenkins was to compete in the Manville Competition, on the Avro biplane, but after a few trials he decided to wait till the wind was less puffy. But the wind did not decrease, and was still blowing hard at 5.30, at which time the competition closes. During the afternoon the Avro hangars were visited by a number of Indians, and Mr. S. V. Setti, being a native of India, was able to explain the machines to them.

Last week these notes mentioned that Lieutenant Schwann had ordered an Avro biplane, to be fitted with a float for rising from water. It should have been Commander Schwann.

Liverpool Aviation School, Sandheys Avenue, Waterloo.

MR. DUKINFIELD JONES was only out for a couple of hours on Thursday last week; on all the other days the wind prevented any flying. On the day mentioned Mr. Jones executed some fine straight flights in strong easterly winds but did not attempt any turns.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—The wind was responsible for the suspension of tuition work on both Tuesday and Wednesday of last week. Taking advantage of the early morning calm on Thursday morning Hubert was giving instruction to the pupils, Driver and

Liles. During a flight with one of the pupils, the wind suddenly rose to twenty miles an hour and further tuition could only be given in the form of straight line flights. Driver was entrusted with full control of the machine later and made two good flights from end to end of the aerodrome.

During the evening, Clement Greswell made a fine flight on the Blériot-Gnome, climbing rapidly to 1,500 ft., and flying for half an hour over the country in the Hendon and Edgware district. Hubert was busy giving instruction to pupils.

Friday was another blank day.

Early on Saturday morning, Hubert was out teaching Driver and Liles. Before commencing, he made a good solo flight of four circuits, and then proceeded to give the pupils passenger flights.

Driver was given control of the school Farman and, disdaining flying in straight lines, he made two good circuits of the aerodrome—a noteworthy performance in view of the fact that it was only the third occasion on which he had taken the levers. After breakfast Liles was given rolling practice with the tall up, Hubert guiding his movements from the passenger seat. No further flying was done that day because of the inclement weather.

Sunday was also a blank day for the same reason.

Salisbury Plain.

ALTHOUGH on Wednesday of last week the wind was very treacherous, the Air Battalion was at work, and Capt. Burke, on his Farman biplane, taking up Capt. Massy as passenger, and Lieut. Reynolds flying a Bristol military extension biplane, had Lieut. Barrington-Kennett as passenger. Captain Burke took off for a trip to Oxford, and was flying at a good height. He was followed soon afterwards by Lieut. Reynolds, but owing to strong winds the latter thought it wiser to return to the hangars. The Bristol School was out at 4.30 a.m., Mr. Fleming giving instructions to pupils, and Messrs. Brereton and Pepper made a few short flights, but it being too gusty to trust pupils very far flying was stopped until the evening. The Air Battalion then got to work again, Lieut. Reynolds with Lieut. Barrington-Kennett headed off towards Brooklands, flying at a good height, but after a short time they returned to the hangars owing to the engine miss-firing. On landing Lieut. Barrington-Kennett got into another Bristol biplane and made a cross-country flight. The Bristol flying school was busy, M. Jullerot, with his new military extension, making several trips, flying very high and including some fine turns and bankings, finishing with a fine *vol plane*. He then took up several pupils. Mr. Fleming was also busy giving pupils lessons in flying. Mr. Pepper made a good show and will be going for his *brevet* soon. Mr. Brereton was doing straight hops.



ON THE BROOKLANDS AVIATION GROUNDS ON WHIT-MONDAY.—Note Latham's smashed machine still "in place" on the roof of the right end shed.

"Flight" Copyright.

On Thursday morning the Bristol school was at work at 4 o'clock, Mr. Fleming carried pupils as passengers, one a new pupil from India who has joined the school. Mr. Fleming gave him a real good idea of flying by taking him to a height of 1,500 ft. Mr. Pepper made a good cross-country flight, and Mr. Fleming took up two mechanics, G. Little and H. H. Bannister, flying at 1,400 ft., making the figure 8, banking well, and finishing with a spiral *vol plané*. Lieut. Reynolds, with a passenger, got away for Brooklands at 3.30 a.m. in the evening.

Mr. Fleming was out giving some exhibition flying. Saturday morning was very dull, but the Bristol School was ready early. Mr. Fleming, however, only made one flight, and the pupils had to be content with lessons on *terra firma*, as it was too bad for them to rise. Capt. Massy made one flight, and Lieut. Connor was about to follow but had trouble with the engine. Lieut. Cammel was testing his engine. Capt. Fulton is away, acting as one of the *Commissaire Sportifs* in the European Circuit, which accounts for the absence of his name from these notes.

SCHOOL AERO CLUB NOTES.

By ROBERT P. GRIMMER, General Secretary, British Federation of School Aero Clubs.

I MUST make a reference to the Elmhurst School Aero Club, Kingston-on-Thames, the able founder and secretary of which is Mr. Christopher Heald. The members are at present engaged in experiments with models of the Clarke type, and flights of 300-400 ft. have already been accomplished.

One of the most important and patriotic duties of the Federation is to supply recruits to the ranks of the aviators of the Empire. There are at our Universities many young men of means and leisure, who, by taking their brevets, could render inestimable service, not only to the various aeronautical firms, but also to the nation at large. There are hundreds of individuals whose lives are entirely devoted to racing, golf, and cricket, at a time when the foreigner is entering upon the heritage of the ages, the boundless realms of that element the taming of which will give to its conquerors the dominion of the world.

The school aero club movement is going to teach the youth of Britain that airmanship is the noblest of professions, and that it is the plain duty of all young men of means and leisure to acquire a practical knowledge of this new and epoch-making science. The work of the Federation will not be complete until the aerial fleets of the Empire ride the winds as supremely as her marine fleets ride the waves.

In response to numerous inquiries, the number of the *Boy's Own Paper* containing my article on "The Achievements of a School Aero Club," is that dated April 29th last, which can be obtained from the publishers at Bouverie Street, E.C., for 1½d. post free, or through any newsagent. The article includes a dozen illustrations,

and should be of great value to any schoolboy interested in the subject.

The school aero club movement has made immense progress on the Continent, especially in France, which has two societies, "La Fédération Française des Aero Clubs Scolaires," and "L'Aviatic Club Scolaires," especially devoted to the work. The educational authorities of that country are lending willing support to the movement, the devoted pioneer of which is M. J. Gache, the well-known French educationalist and writer on aeronautics. The various affiliated organisations are hundreds in number, and inter-school contests have attained to an enormous popularity. I sincerely hope that the members of the "British Federation of School Aero Clubs" will be able to work in unison with their French comrades, who have already suggested an international competition between representative teams.

June and July are the months for school sports. It has been suggested to me by several correspondents that the Federation should arrange demonstrations of model aeroplane flying at various school sports, especially those taking place in remote parts of the country, where no aeroplanes have yet been seen. If any organiser of sports—school or otherwise—wishes to include in his programme the fascinating and novel item of model aeroplane flying, I am prepared to arrange flights of a quarter of a mile and upwards with models that have been awarded over a score of prizes in public competitions. The flying of an efficient aero model never fails to arouse interest in aviation, and I hope the idea may be widely taken up by school authorities.

THE A.C.F. GRAND PRIZE.

ALTHOUGH the full and complete regulations are not yet published, it is more or less certain that the competition for the prize of £4,000, offered by the Automobile Club of France, will take the form of out and home trips from an aerodrome in the neighbourhood of Paris. Three routes have been named, one from Paris to Roubaix and back with a probable landing at Amiens; a second from Paris to Le Mans and back, landing at Nogent le Rotrou; and a third from Paris to Dieppe and back. The date has

not been definitely decided upon, but the competition will probably be held at the end of July.

The regulations will be very severe, and it is intended that no essential part of any competing machine shall be changed during the competition. A novel proposition has been made by several members of the Committee of the A.C.F. that they should purchase the winning machine and present it to the Government for the use of the Army.



"Flight" Copyright.

René Labouchere at Brooklands just released for a flight on his Antoinette monoplane.

NEW ARMY BIPLANE.

AN ORIGINAL "TAIL-FIRST" DESIGN FROM THE AIRCRAFT FACTORY.

By a CORRESPONDENT.

VERY quietly and without any blowing of trumpets to disturb the watchers of the Press, the military authorities at Farnborough have been testing these last few days a new army biplane of the tail-first type, which has been designed and constructed under the direction of the Superintendent of the Aircraft Factory. Truly, it has not thus far made any flights of note, ill-fortune having dogged its steps. On its first appearance it buckled its driving-gear and subsequently its landing-gear, but when the new under-carriage that is, I believe, in course of construction is fitted, some good flights may be expected, for the general design is, it seems to me, distinctly good.

The general appearance of the machine is distinctly out of the ordinary, as may of course be judged from the mere statement that it is a biplane of the "tail first" type. It has a monoplane type boat shaped body, in which the pilot and passenger sit well forward of the main planes. The passenger sits behind the pilot and slightly on a higher level. Just in front of the bottom plane is an 8-cylinder 60-h.p. E.N.V. engine, fitted with a light fly-wheel. The propeller is situated immediately behind the plane and is driven by a single chain at about two-thirds the engine speed. Two spiral tube radiators are attached to the sides of the body.

At the forward end of the body is the single plane elevator, which is mounted in halves on either side thereof and from its attitude is evidently intended to carry a fairly high loading. Of the main planes it is interesting to remark that the lower plane only has a

considerable dihedral and that the struts are both few in number and particularly substantial in construction. One row is situated close to the leading edge while the other is placed about midway along the chord so that the trailing edges are presumably flexible beyond the ordinary degree. All the struts are of stream line section. The top plane alone carries the usual balancing flaps and behind the main planes, carried on slender outriggers, are the twin vertical rudders.

The under-carriage consists of two long skids carried from the fuselage on which the axle is fixed by the ordinary rubber bands; no tail skid is fitted, but instead, at the rear of each main skid is a small pivoted and spring-controlled shoe; this arrangement has proved anything but satisfactory, and will shortly be radically altered.

Constructed as it is, the machine should possess a marked degree of lateral stability, and the engine power should be ample for speeds of 45 to 50 miles per hour, especially as the head resistance has been reduced as far as possible by covering in the fuselage, and by the adoption of as few spars as possible. How it will behave in side winds is yet to be proved, as the covered-in fuselage presents a fairly large area sideways owing to the fact that it has to be solidly constructed, and of fairly deep section throughout, so as to safely carry the load imposed upon it by the elevator, and also the passenger and engine.

TESTING FABRIC AT THE NATIONAL PHYSICAL LABORATORY.

At the National Physical Laboratory there has now been installed by the well-known scalemakers, W. and T. Avery, Ltd., a machine that greatly facilitates the operation of testing the fabrics employed for the envelopes of dirigibles and the sustaining surfaces of aeroplanes. Specimens of fabric, of any length between 6 ins. and 25 ins., can be tested in this machine, the general arrangement of which is illustrated by the accompanying sketch. The fabric is placed between the grips, and the construction of the machine is such that the fabric may, if it is capable of doing so, stretch as much as 10 ins. before it comes to the limit of the accommodation provided by the apparatus. The strain on the fabric under test is applied by hand through gearing, and is measured by the weighing apparatus at the top of the machine. As a means of making very delicate variations in the load, fine shot is allowed to flow into a scale pan, the flow being automatically stopped when the specimen breaks.

The following is Messrs. Avery's own technical description of the construction and action of the machine:—

The weighing arrangement consists of a main lever and a steelyard, fitted with hardened steel knife edges, which rest on hardened steel bearings carried from the main standard.

The steelyard is graduated on both the back and the front; the front graduations range from zero to 200 lbs. by 1-lb. divisions, the graduations at the back of the steelyard from zero to 40 lbs. by $\frac{1}{4}$ -lb. divisions. The front graduations are used when both the lever and the steelyard are being used as compound levers for indicating the loads.

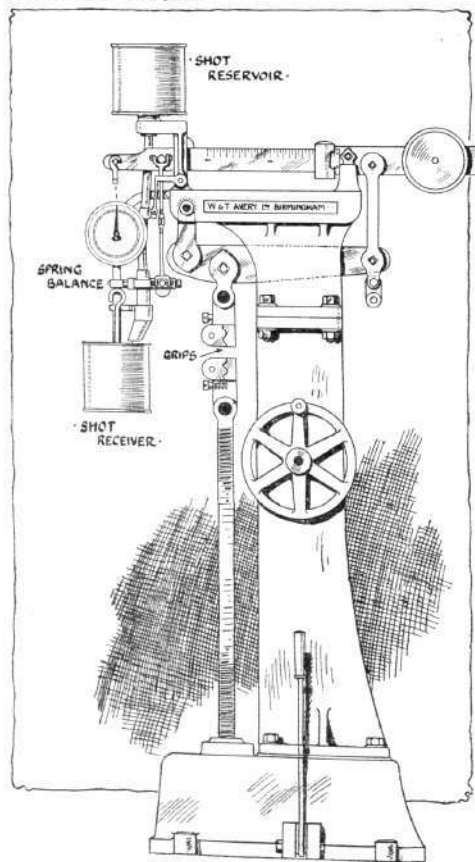
When finer readings are required, the weighing system is swung round upon the standard so as to bring the rear knife-edge of the steelyard directly over the specimen; the main lever is then out of use and the steelyard is in operation as a single lever, the graduations ranging from zero to 40 lbs. being then used. The end of the steel-yard is fitted with a hardened steel knife-edge, from which a receiver is suspended.

A spring balance is interposed between the receiver and the steelyard, the dial of which is graduated to show the breaking loads, i.e., up to 1,200 lbs. by subdivisions of 1 lb. and 240 lbs. by subdivisions of $\frac{1}{4}$ lb. respectively. An upper reservoir is carried by a main standard, and fine shot is allowed to flow from this to the receiver. The flow of the shot is regulated so that the load is applied to the specimen at the rate of 500 lbs. per minute, and the flow is automatically cut off when the specimen breaks.

In preparing and applying the test, the specimen is connected to the roller attachment, the shot is allowed to flow from the reservoir into the receiver, and the strain is slowly applied with either of the two changes of gear, thus keeping the steelyards floating midway in the carrier. For low capacities the quick speed is used for the strain, and the weighing apparatus revolved in the standard so as to bring the steelyard into use as a single lever. For high capacities the slow strain is applied, and the result weighed by means of the main lever and the steelyard compounded together.

When the specimen has been broken, the receiver containing the shot is suspended from the link hanging from the rear knife-edge of

the steelyard and then balanced by means of the loose proportional weights and the sliding poise.



BRITISH NOTES OF THE WEEK.

Mr. H. M. Maitland Progresses.

IT is good news to hear that Mr. H. M. Maitland, who broke both his thighs and sustained injuries to his knee in an 80 ft. fall when flying on Salisbury Plain last March, is making such good progress that he has been moved from the nursing home in London to the hospital at Frimley, Surrey.

Prizes from Harrogate.

IN connection with the *Daily Mail* competition, in which Harrogate will be the first stop from London, Mr. James R. Ozden, of Harrogate, has offered a very fine silver cup, which will be awarded to the aviator who makes the quickest flight from Hendon to Harrogate. The Yorkshire aviator who makes the best flight over this portion of the route will receive a cash prize.

Worthing Meeting Postponed.

ALTHOUGH there is no difficulty about finding the necessary cash, it has been decided for several reasons to postpone the proposed flying meeting at Worthing until later in the season. This does not mean, however, that Worthing will not see any flying until then, as an endeavour is being made to arrange some demonstration flights from Shoreham to Worthing, and, in fact, it was hoped that such a flight might have been made on Wednesday last.

Brighton-Shoreham Aerodrome Developments.

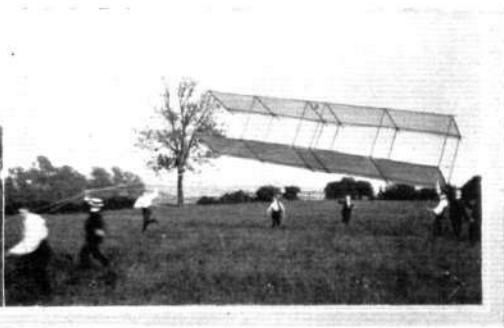
IN view of this aerodrome being one of the stations in the European Circuit elaborate preparations are being made for the comfort of the public on the 27th and 29th inst., while a prize of £200 is being offered for the first competitor to arrive on his way to London and a similar prize will be given to the first flyer to arrive on the return journey. The ground is being arranged so that there are no less than six entrances and eight enclosures. In one of the three enclosures for vehicles there will be one with numbered and reserved stands and a Grand Stand. There will also be five other enclosures for the general public, the price of admission ranging from one to five shillings. Arrangements have been made for a programme of music to be played each day by the Band of the 4th Royal Irish Dragoon Guards. The attractions for Coronation week included a series of demonstrations by Mr. Barber on a Valkyrie racing machine.

Mr. H. G. Ferguson's Progress.

SINCE the accident to his machine at Magilligan last year Mr. Harry Ferguson has constructed a new monoplane, and having arranged to give a demonstration at Newtownards on Thursday of last week he had the machine towed down to that place by motor from Belfast on Monday. As soon as the machine reached the beach Mr. Ferguson fitted the wings to it and, starting the engine, was off the ground for his first flight in 50 yards. This little essay was entirely unpremeditated as the wind was blowing a good half gale, and Mr. Ferguson had no intention of flying under the circumstances. The lift, however, was so great that a strong gust got its work in, and, owing to the nature of the ground, the wind velocity rose as the machine rose, and of course kept it going on up. Mr. Ferguson tried to land nearly a dozen times, and every time as he dropped and got into the slower-moving air below, the machine dived, and he had to go right up again to save it from damage. Mr. Ferguson had a very exciting time, but even then he would have landed perfectly after his mile flight, but for a crowd of people getting in the way. In order to avoid them, he had actually to dive suddenly from a height of 20 ft., and it was very fortunate that he escaped personal injury. The only damage done to the machine consisted of a few broken wires, a damaged skid, and a smashed propeller. It speaks well for the design and construction of the machine, however, that it should fly so well under such conditions, and it should give a good account of itself in the hands of Mr. Ferguson during this summer season.

Mr. Ferguson has a Smash.

ILL luck, however, dogged this plucky young Irish aviator on Wednesday of last week, and as a result his machine is completely wrecked. After making one or two good trials over the ground at Newtownards by himself he made two with passengers, the passengers including one weighing 13 stone. The last flight was also with a passenger, and after he had been carried for about a mile Mr. Ferguson landed in good style from a height of 25 ft. Just as he landed and switched off the engine, however, the front wheel stuck in a small mud bank, causing the chassis to collapse and wrecking the machine. Unfortunately the passenger, who was one of Mr. Ferguson's mechanics, was rather badly hurt, but he is making good progress and hopes to be all right in about a fortnight.



CONISBOROUGH AND DISTRICT AEROPLANE SOCIETY.—The glider which has been presented to the Club by the Sheffield Aero Club in use by members of the Society last Whit-Monday, when, the wind being very slight indeed, it carried a passenger at a height of 20 ft. Since being acquired it has been cut down from 42 ft. to 24 ft. span.

Nieuport Regains Speed Records.

LEBLANC was not left long in undisputed possession of the world's speed record, for on the 16th inst. at Mourmelon while making a trial in connection with the French eliminating tests for the Gordon-Bennett, Nieuport once more placed the records to his own name. He was using a Nieuport monoplane fitted with a 70-h.p. Gnome engine. The greatest speed attained over one lap was 130.57 k.p.h. while the average speed was 129.217 k.p.h. It was unfortunate that a mistake was made in counting the laps and

Nieuport came down after covering 145 kiloms., one lap short of the distance necessary to qualify for the Gordon-Bennett race. The following are the new figures for the distances from 5 to 100 kiloms. :—

	m.	s.		m.	s.
5 kils.	2	18½	40 kils.	18	31½
10 "	4	37½	50 "	23	10
20 "	9	14½	100 "	46	27½
30 "	13	53½			

FOREIGN AVIATION NEWS.

A Prize from Turin for Frey.

THE executive committee of the Turin Exhibition have not been slow to recognise the plucky attempt of Frey to fly to their city from Rome, and have sent a cheque for £400. They have also been most assiduous in their anxiety to make Frey as comfortable as possible. The latest reports say that in the hands of the Pope's physician, Prof. Mazzoni, he is making excellent progress, and if there are no complications it is hoped he will be well again in a couple of months. The municipal authorities of Turin have also decided to present a gold medal to Frey.

Breguet Machines for French Army.

AT the Douai Aerodrome on the 15th inst., Lieut. Ludmann and Lieut. Fequant, on behalf of the French military authorities, accepted delivery of five Breguet biplanes. Each one was put through a test flight by either M. Breguet or Debussy, and attained an altitude of 600 metres, a speed of 95 k.p.m., with a useful load of 305 kilograms, on board. Breguet, flying with the wind, attained a speed of 120 k.p.h.

Garros' Appeal Dismissed.

AT the meeting of the Commission Sportive Aeronautique held on the 16th inst., further consideration was given to the protest made by Garros in connection with the award for the Paris-Madrid race on the ground that Vedrines changed his machine. After considering the rules, &c., it was decided that the protest must be dismissed.

New French Military School at Rheims.

ON being appointed chief pilot at the new French Military Flying School at Rheims, Lieut. Girard was ordered by General Roques to transfer the machines at Mourmelon to Rheims by way of the air. A start was made on the 14th inst., when Lieut. Girard, in spite of a strong wind, piloted the first of the machines to the new school.

Maurice Farman takes M. Krebs for a Spin.

ON the 14th inst., among the visitors to the Farman School at Buc was Commandant Krebs, the director of the Panhard-Levassor firm. He was taken for a lengthy trip by Mr. Maurice Farman, who afterwards carried M. Delfy, an engineer of the Panhard firm.

Injured French Officer Decorated.

ON the 6th inst., at the Military Hospital of St. Cyr, Lieut. Loder, who was seriously injured in an aeroplane accident some time ago, was decorated with the Cross of the Legion of Honour.

A Trial for a Canvas Hangar.

THE strength of one of the canvas sheds erected by MM. Bessonnet at Buc, was severely tested the other day when a Maurice Farman biplane of the military type made an impromptu landing on the corner of the roof. Except that the fabric was slightly slit in two places by a broken skid the shed suffered very little damage, while the aeroplane also only sustained a little *batis cassé*.

Honour for Lieut. Conneau.

ON his return to Paris Lieut. Conneau, who, as "Andre Beaumont," won the Paris to Rome race, was received on the 14th inst. by M. Delcasse, the French Minister of Marine, who congratulated the aviator on his success, for which he has been nominated to the Order of the Legion of Honour.

Training for the European Circuit.

IN view of his entry for the European Circuit, the unfortunate Landron put in some good practice at Juvisy last week on his Pischoff monoplane. On the 13th inst. he was flying for an hour, and during that time was seldom at a height of less than 800 metres.

Chalons to Vincennes in Fast Time.

USING one of the new racing Henry Farman machines, with which he was to take part in the European Circuit, Bill left the Henry Farman School at Mourmelon on the 16th inst., and flew to Vincennes in 1 hr. 32 mins. Chalons was left at 3.28, and the landing at Vincennes was made at 5 o'clock exactly.

Activity at Maurice Farman School.

THE Maurice Farman School at Buc is now kept very busy, and on one day last week seven passengers were taken for flights, one military pupil passed for his *brevet*, three other military pupils made tests which gave promise that it would not be long before

they were qualified. Naval Lieutenant Cayla also went for a long trip over the surrounding country, while Barra, rising to a height of over 1,000 metres, was flying for more than an hour. This is but typical of the usual day's work at this school.

Mr. Robert Loraine to Fly a Monoplane.

FOR some time Mr. Robert Loraine has been in France with a view to purchasing a new mount, on which to take part in some of the events in Great Britain this year, and we understand that he has decided to acquire one of the latest Nieuport machines.

The Danish Cross-Country Circuit.

A PRIZE fund of £1,800 has been subscribed for the Danish cross-country circuit, and the arrangements for the competition are now well in hand. The start will take place on July 2nd from Scaw, and the competitors will fly through Jutland, Funen, and Zealand, finishing at Copenhagen on July 9th. Six entries have already been obtained.

A Circuit for Belgium.

NOT to be behind other countries, Belgium is to have a cross-country circuit, and arrangements are being made for it to take place during the second week in August. The arrangements are in the hands of the Belgian Aero Club, and it is suggested that the programme should be:—August 6th, Brussels-(Mons)-Casteau; August 8th, Mons-Casteau-Tournai; August 10th, Tournai-Blankenberge; August 13th, Blankenberge-Antwerp; August 14th, Antwerp-Liège; August 15th, Liège-Brussels.

Spanish Cross-Country Flight.

THE Royal Aero Club of Madrid, in conjunction with the municipal authorities at Valencia, is organising a cross-country flight from Valencia to Alicante and back on July 28th and 29th.

St. Petersburg-Moscow Flying Race.

THIS event has been fixed to take place from July 10th to the 23rd next.

A Goupy in Russia.

ON the 13th inst. Ladougue was at Gatschina in order to demonstrate the Goupy biplane which he has just delivered to the Russian Military School there. He made several flights with officers, during one of them rising to a height of 800 metres. The trials were witnessed by the Dowager Empress and the Grand Duke Alexander.

American Inter-Varsity Contest.

SO sanguine are some of the leading sportsmen of New York that aviation will take a foremost place in college athletics, that an Inter-Collegiate Aeronautical Association of America has been formed. Yale and Harvard already have strong aero clubs, while in an inter-collegiate balloon race, held at North Adams on June 23rd, seven well-known American colleges were represented. How about Oxford and Cambridge teams?

Testing Parachutes for Airmen.

NO doubt taking a leaf out of Montgolfier's book, an American inventor of a safety parachute for aviators is proposing to test the appliance by dropping several dogs attached to samples from balloons and aeroplanes. No details are available as to the arrangement of the apparatus except that it fits into a compact brass tube and that it is quickly spread by a spring arrangement. It is to be hoped, however, that the dogs will have as pleasant a time as the sheep and ducks in Montgolfier's experiments, but for our part, in any case, we hardly appreciate the peculiar enterprise that suggests the unnecessary use of dumb animals for such appliances in their experimental stages.

An American Aero Motor Competition.

WITH a view to assisting in the development of a suitable American-built aero engine, the Automobile Club of America has offered a prize of 1,000 dollars for the maker of a motor making the best showing in certain tests which are being organised by the Club. The motor will first of all be required to run for three hours at a declared speed, any falling off of revolution below 85 per cent. automatically disqualifying the machine. Subsequently the motor will be tested as to its ability to start easily, slow running, quick acceleration, fuel consumption, freedom from vibration, and lubrication efficiency. Marks will also be given for the best average of horse power per pound weight of motor and accessories, and for the greatest amount of horse power per pound weight for each 100 revs. per minute.

THE EUROPEAN CIRCUIT.



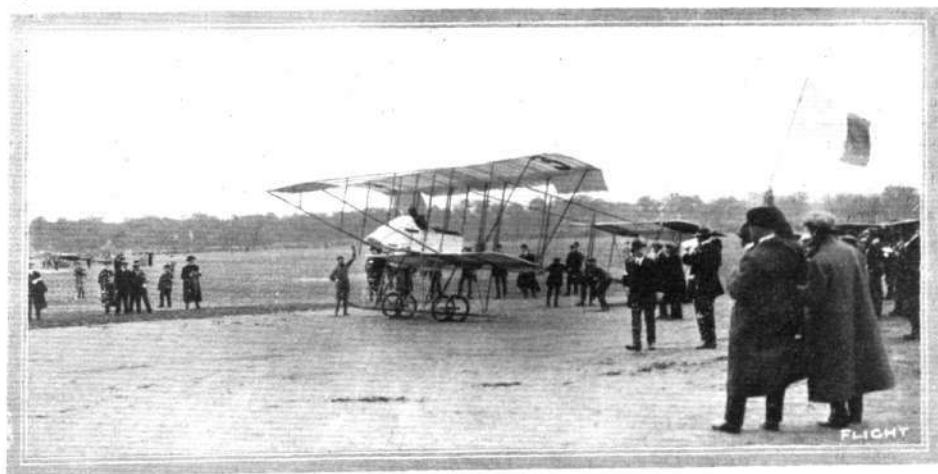
EUROPEAN CIRCUIT.—General view from behind the starting line at Vincennes.

By way of explanation to our readers, we must preface our report of the doings on the opening day of the great aerial race round Europe by stating that owing to the necessity of going to press on Monday morning because of the Coronation holidays, it has been impracticable to give details beyond those of the opening stage.

At midnight on Saturday the parade ground at Vincennes had already been invaded by a large crowd who were anxious to witness the start, and the soldiers and police, to the number of 6,000, had a great task to keep the people under control. A heavy rain fell during the morning but this seemed unable to in any way damp the enthusiasm of the concourse of sightseers, which numbered well over the half million. At 6 o'clock two rockets were fired to notify the starting of the event and almost at once Tabuteau on the British built Bristol flew over the "A" starting line and was soon lost to sight. In view of the large number of competitors three starting lines had been arranged, "A," "B" and "C," the competitors taking their departure from each of the three tracks consecutively at two minute intervals so that there was an interval of six minutes at each starting line. Altogether 43 out of the 52 competitors who figured on the official programme were started, and 21 got through without trouble to Rheims, the "halfway" control for the day. Unfortunately, a fatality occurred during the starting operations to Lemartin on one of the Blériots. He had made a good start, and was heading off to Joinville at a height of about 80 metres, when the

machine seemed to suddenly collapse and fall to the ground, the aviator being so terribly injured that he died very shortly after admission to the hospital. It will be remembered that it was Lemartin who carried eight passengers on the Blériot four-seated "bus" at Pau some time ago. Almost at the same time that this accident occurred came the news that Lieut. Princeteau, one of the officers who had received permission to follow the course, had met with a fatal accident while starting from Issy for Rheims. He had only risen to a height of about 30 metres, when apparently the carburettor of his machine caught fire, and in the sudden landing rendered necessary the monoplane capsize. The wrecked machine at once burst into flames and before anything could be done the unfortunate officer was burnt to death. The third fatality occurred at the Chateau Thierry, where Landron met his death in somewhat similar fashion to Lieut. Princeteau. The machine fell from a great height and the wreckage immediately burst into flames, making it impossible to rescue the pilot. One other competitor was seriously injured, this being Lieut. Gaubert, who was flying a monoplane under the *nom de guerre* of Dalger. The machine fell at Soissons and the pilot had both his legs broken and sustained serious injuries to his head.

The first to arrive at Rheims was Vidart on his Deperdussin monoplane, and five minutes later he was followed by Vedrines on a Morane, Prevost on a Deperdussin, "Beaumont" on his Blériot,



EUROPEAN CIRCUIT.—Tetard in one of the British Bristols at the moment of starting from Vincennes on Sunday. Note the huge crowd in the distance.



EUROPEAN CIRCUIT.—Two great heroes on the starting line at Vincennes—Garros and Beaumont. The latter (No. 12) is just receiving the signal to get away, his companion following him at the next starting interval.

Duval on a Caudron, Loridan on a Henry Farman, followed by a number of others in quick succession. Most of them did not stay at the control long, but left as soon as possible to complete the day's stage at Liège. Here again Vidart was the first to arrive, and his time for the course of 203 miles (325 kiloms.) was 3h. 9m. 54s.

The second was Vedrines, Weymann on a Nieuport was third, "Beaumont" fourth, Barra (Maurice Farman) fifth, Duval (Caudron) sixth, and Garros (Blériot) seventh. The following table gives the official starting times and official numbers of the competitors, together with the officers who are also flying over the course:—

COURSE A.		COURSE B.		COURSE C.		Officers from St-Cyr.	
No.	Aviator and Machine.	No.	Aviator and Machine.	No.	Aviator and Machine.	Capt. Eteve, passenger	Lieut.
1	Tabuteau (Bristol*).	5	Vedrines (Morane).	8	Bathiat (Sommer).	Marzac (M. Farman*).	
3	Tetard (Bristol*).	6	Frey (Morane).	9	Kimmerling (Sommer).	Lieut. Chetin, passenger	Lieut.
12	Beaumont (Blériot).	7	Gaget (Morane).	10	Molla (Sommer).	Coville (M. Farman*).	
13	Garros (Blériot).	15	Vidart (Deperdussin).	22	Wynmalen (H. Farman*).	Lieut. Grailly (Rep*).	
14	Morin (Blériot).	16	Prevost (Deperdussin).	24	Bielovucic (Voisin*).	Lieut. Princeteau (Blériot).	
25	Amerigo (Rep).	17	Pascal (Deperdussin).	27	Duval (Caudron*).	Officers from Vincennes.	
26	Bobba (Rep).	18	Legrand (Deperdussin).	28	de Robillard (Antoinette).		
29	Denhaut (Danton).	23	d'Hespele (Deperdussin).	30	Loridan (H. Farman*).		
36	Contentet (Astra*).	38	Lesire (Morane).	31	Charlix (Caudron*).		
37	Labouret (Astra*).	42	Garnier (Morane).	33	Renaux (M. Farman*).	Lieut. Chevreau (Blériot).	
46	Le Lasseur (Blériot).	48	de Nissolle (Tellier).	34	Allard (Caudron*).	Lieut. Maillols (Nieuport).	
47	Barillon (Barillon).	49	Weymann (Nieuport).	39	Barra (M. Farman*).	Lieut. Clavenad (Blériot).	
51	Gibert (Rep).	53	de Francq (Deperdussin).	40	de Laot (Caudron*).	Lieut. Delage (Nieuport).	
55	S. Fersa (Vinet).	54	Valentine (Deperdussin).	58	de Romance (Bonnet-Lab.).	Lieut. Ludman (Breguet*).	
62	Landron (Pischhof).	56	Morisson (Morane).	60	Bill (H. Farman*).	Officer from Chalons.	
64	Lemartin (Blériot).	63	Verrept (Morane).	61	Georges Gay (Voisin*).		
65	Fuhling (Blériot).	65	Dalger (Morane).	67	Train (Train).	Lieut. Blard (Henry Farman*).	
68	Van Meel (Van Meel*).						

* Biplanes. All others are monoplanes.

For the convenient reference of our readers we reprint also the programme of the race and particulars of the prizes offered:—

The Stages.

June 18th.—First stage. Paris to Liège. Control at Rheims. Start from Vincennes, finish at Ans aerodrome, Liège. Prize £1,600.

June 20th.—Second stage. Liège-Spa-Liège. Control at Belle Fagne, near Malchamp. Prize £400.

June 21st.—Third stage. Liège-Utrecht (Soesterberg). Control at Verloof. Prize £1,200, and £400 for first Dutch aviator.

June 23rd.—Fourth stage. Utrecht-Brussels. Control at Breda. Prize £1,600 (£1,000 for the section Paris to Brussels, and £600).

GERMAN NATIONAL CIRCUIT.

THE third stage of the German National Circuit was made on the 15th inst., when four aviators started from Schwerin for Hamburg, a distance of 125 kiloms. Buchner was the only one to get through without a stop, and he took 2 hrs. 21 mins. for the journey. Lindpaintner was the next to complete the course, he making a lengthy stop at Teedorf. Wiencziers very nearly completed, but had to stop at Kirchsteinbeck, about seven miles from Hamburg, owing to thick fog, while Koenig was obliged to land at Roseberg, about 30 miles short of Hamburg. The fourth stage was made on the

17th when eight competitors set out for Kiel. Lindpaintner was the first away one minute after four o'clock, and he was followed by Wiencziers, Schauenberg, Laitsch, Thelen, Lieut. Jahnow, and Wittenstein, the latter having flown from Schwerin to Hamburg on the previous day. All got through safely with the exception of Laitsch, who came down in a forest in the neighbourhood of Elshorn and damaged his machine so seriously as to put him out of the competition. Fortunately, however, he escaped serious injury.

EXPERIMENTS AT RAJPUTANA.

By H. S. WILDEBLOOD.

ABOUT a year ago I set myself, during the little leisure I was able to obtain, to study the theory of flight with the object of building a full-sized machine and, if possible, introducing improvements on existing types, which, however successful for spectacular displays, can scarcely be considered as safe as it is necessary for them to become before they become popular, as a means of locomotion or sport, with even the British sportsman of the polo-playing, pig-sticking type, to say nothing of the larger pleasure-loving section of our sporting race. To this end I made numerous models of rough construction but sufficiently well put together to test the theories that occurred to me during the work. Fortunately I was helped by two natural circumstances which aided me considerably, the existence of the high winds which blow in the hot weather in Rajputana, where my experiments were carried out, and the presence of numbers of kites which soar by the hour in winds of all velocities and which scarcely ever flap their wings. Oddly enough

is not possible, I almost hear you say, and indeed so it appears at first sight; but examine a bird's wing with its feathers and quills, the latter approaching the outer edge of the flexible feather more and more as we near the outer edge of the trailing wing tip and examine the theory of wind pressure on such a structure, and you will, I think, agree that the point

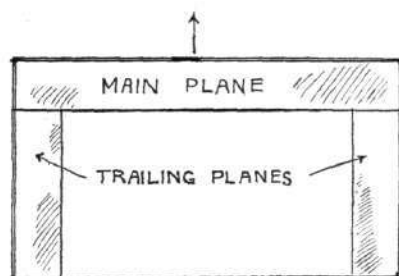


FIG. 1.

however, I believe that the results arrived at were largely founded on pure theory and afterwards tested by model experiment and confirmed as far as possible by the structure and movements of birds. The great need, it appeared to me, was to design an aeroplane that would be less liable than the existing types to capsize laterally when flying across a strong wind. After many experiments with models of endless variety and after many failures I was at last rewarded by seeing a model, which had turned numerous somersaults during its previous flights in the strong monsoon winds, suddenly endowed with life and sailing across, against and with the strongest and most unsteady gusts, in which I could sometimes scarcely keep my balance when throwing it, in a way that told me I had discovered what I had so long been looking for. It was a little thing which had been added to my model, merely a trailing plane behind each end of the main plane,

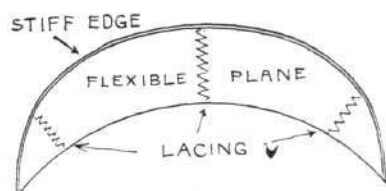


FIG. 5.

the outer edges of the trailing planes consisting of stiff canes as indicated by the double lines and the rest of the planes consisting of canvas free to move up and down to a certain extent, except along the edge by which it was fixed to the cane, but that little thing had enabled my model to fly parallel to the earth's surface across a monsoon gale, when merely thrown by hand at quite a low velocity. The thing

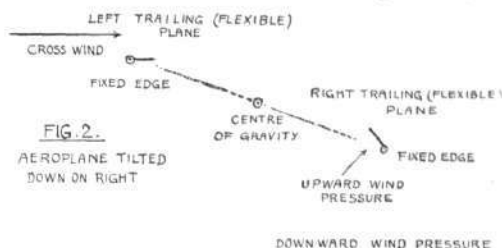


FIG. 2.

AEROPLANE TILTED DOWN ON RIGHT

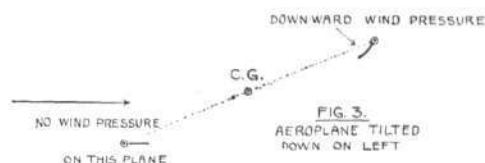


FIG. 3.

AEROPLANE TILTED DOWN ON LEFT

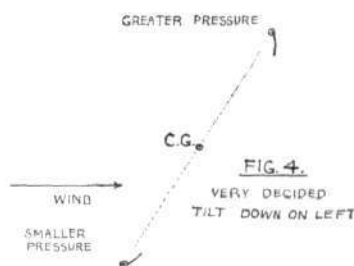


FIG. 4.

is not unworthy of attention. Since the strong winds, which are the greatest danger to airmen, must necessarily blow more or less parallel to the earth's surface as a general rule, it follows that a tendency to retain an aeroplane or

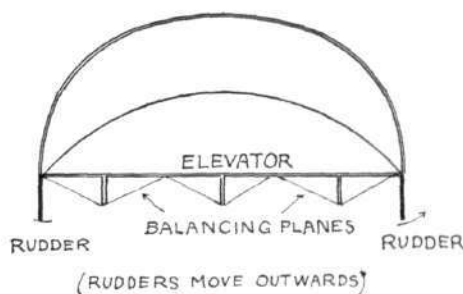


FIG. 6.

bird's wings in the stream lines of such winds is a useful one as tending to keep the machine parallel to the earth's surface.

In the structure of the bird's wing and in the model described above such a tendency is arranged for and acts as follows. When the aeroplane is tilted as shown in the sketches the air pressure on the trailing planes or

wing tips is so distributed as to tend to right the machine into the wind stream lines.

In Fig. 2 the right trailing plane is lower than the left, in Fig. 3 the right is higher than the left, and in Fig. 4 the tilt of the machine is so great that the left trailing plane has reached the limit of its possible movement. In all of these figures the resultant wind pressure on the leeward trailing plane is greater than that on the windward trailing plane and the direction of this greater pressure is such that it tends to restore equilibrium in the wind stream lines. In the case of soaring birds, like the kite, there is no evident effort necessary to keep them in the wind stream lines. The effort is, however, very apparent when they wish to get out of them in order to turn. The best plan form of the main and trailing planes that I have so far discovered is a crescent-shaped combined plane with leading and outer edges stiff and the remainder of the plane flexible and laced across the centre and across the tips as shown in order to adjust the degree of relative flexibility in the central and trailing portions.

This shape certainly appears to give excellent results in model experiments and to have a very large degree of automatic stability in wind and calm. I have found that the best position for the vertical rudders for steering to right and

left is at the rear extremities of the wings, the reason for this being that, no matter whether the angle of incidence of the rudder is small or great, the leverage about the centre of gravity, which latter appears to be best situated in the region of the middle of the central section of the plane, is considerable. I have added an adjustable triangular tail elevator, and for controlled balancing by the pilot, which should, I think, not be dispensed with, no matter how much we may improve the automatic stability of an aeroplane. I have added similar triangular balancing planes to right and left of the central one at the tail, as shown below:—

The front edges of these triangular rear planes are fixed and the balancing planes are only dipped downwards by raising the rear edge in order that the component depressing and retarding air forces thereon may be on the same side of the machine, thus both helping to right the latter without any swerving, which has to be corrected by the application of a rudder in existing practice. A slight initial dip to both the balancing planes increases the automatic stability. I have found that models made on these lines do not make mistakes and are infinitely more reliable in cross winds than any other forms I have tried, including those now in common use.

CORRESPONDENCE.

*. The name and address of the writer (not necessarily for publication) MUST in all cases accompany letters intended for insertion, or containing queries.

Correspondents communicating with regard to letters which they have read in FLIGHT, would much facilitate ready reference by quoting the number of each such letter.

Low Powered Flight.

[1229] Referring to Mr. John Guy Gilpatrick's letter in FLIGHT (1179), saying that two American gentlemen have flown with a 4-h.p. and 5-h.p. engine respectively, it is curious we have not heard about it in England before. Perhaps Mr. Gilpatrick will furnish further particulars of these two machines, i.e., span, weight with engine complete but without pilot, and diameter of propeller or tractor as the case may be, and photographs, when I and I daresay others would be more satisfied. Trusting this catches the eye of Mr. Gilpatrick.

R. G. P.

[We have asked Mr. Gilpatrick to furnish further information.—Ed.]

Zahm's Skin Friction Article.

[1230] The footnote to A. F. Zahm's article in your issue of May 20th, 1911, at page 450, raises a point that has long interested me from the point of view of animal motion.

I consider that the glide enters into the beating wing progression of the bird, and that all the bird has to do, when he is not in a hurry, is to make the air that meets his wings relatively an up current, i.e., he beats his wings downwards, recovers himself, and begins again. Of course screw propulsion also enters into the movement, but has already been dealt with quite adequately by all the pioneers since Pettigrew and Marey.

To imitate this action mechanically without reciprocating mechanism ought not to be so hard as is supposed.

What is needed is a gliding helicopter—one that cannot rise from the ground without a run, but that glides forward when set free in the air with the helices revolving as lifting screws. To obtain efficiency the usual aspect ratio should be observed, i.e., 6 or 7 helices side by side in pterygoid aspect would be easier to obtain success with than a single huge helix (aspect ratios $\frac{7}{1}$ to $\frac{1}{1}$). Each

helix when revolving represents a solid disc with a thickness formed by the pitch of the blade, so that for the purpose of providing each disc with an entering and trailing edge it would seem that the extremity of each blade-tip should be thin and set without any pitch.

This idea was suggested to me while amusing myself and others with a little three-bladed "boomerang" of cardboard. When given a slight pitch in the blades and spun, while at the same time thrown forward, the toy glided and soared according to the different proportions of the spinning and propelling forces. Of course in this toy, the weight of the whole being at the centre, there is no natural glide, and a propelling force must be used.

As a résumé I may say that my idea is simply an ordinary aeroplane frame (minus propeller, perhaps) with a row of "lifting" helices set along where the wings now go. The balance and other points of design would not be very different from the present form.

The practical difficulty is to get a framework to stand the strains, and a suitable transmission gear.

A. F. M.

Vortex Flight.

[1231] Even though we may be unable to use the same methods ourselves, the study of insect flight introduced to your readers by Mr. Dring is one of which all should take note.

The practical outcome of Mr. Dring's study is a new type of propeller, and as Mr. Dring's views in that particular direction are not altogether clear to me I may perhaps be permitted to ask for further information and more precise mathematical data from actual tests.

Richmond.

C. J. STOKES.

[1232] I have read Mr. Dring's article on Vortex Flight with much interest, all the more so as I have worked along similar lines myself. I may therefore venture an opinion, without prejudice, that Mr. Dring's vortex propeller is a less efficient device than the ordinary propeller. I might also remark that some of his diagrams show air paths taking a course that are not in accordance with the results of my own research.

Edmonton.

J. P. HAMBLETON.

[1233] I read Mr. T. A. Dring's information on "Vortex Flight," which appeared in your valuable journal on the 3rd inst., with very great interest.

As Mr. Dring seems to have closely studied the habits and methods of flight of the gadfly and similar insects, I wonder if he can give any information as to the exact use and necessity of what are popularly known as "balancers" in such insects as the ordinary housefly, "daddy longlegs," &c.

These "balancers," of which there are two, look like drum-sticks, and in the blue-bottle are about 1 mm. in length. In the case of the house-fly and blue-bottle they are partly concealed and protected by a form of shield, but in the daddy long-legs they are, so far as I can remember, not protected, and are much larger in proportion.

If these "balancers" are removed, which in no way appears to interfere with the proper action or motion of the wings, it is for some reason impossible for the insects to fly.

If Mr. Dring, or any other reader, can give me any information as to their object, I shall be much interested to learn about it.

Chiswick.

VICTOR H. GREGORY.

The Clarkson Aerocar.

[1234] I should like to thank Mr. Fleischberger for his letter (1193), and also others who have communicated with me on this matter, and as it is impossible to write each one fully I will take this opportunity, with your permission, of giving a few details. I cannot do better than quote from a report of a lecture which I gave under the auspices of the Manchester Education Committee at their

Municipal School of Technology, and which appeared in *Engineering*, November 25th, 1910, page 732, as follows:—"He gave several demonstrations from a model 8 ft. in diameter of a new form of propeller or elevator which he has invented. The invention is intended to solve the problem of vertical and slow flying. When the propeller, which is of the construction of a feathering paddle-wheel, had been perfectly counterbalanced, various weights were attached to the frame, and the propeller, which was driven by an electric motor, made to revolve. As soon as it attained the required speed it rose gently and vertically from the floor until it reached a 'stop,' which had been fixed to prevent it going too high. After remaining there a little while the speed was slightly reduced, and it descended slowly, finally resting on the floor almost silently. Another test was then made showing it hovering in the air, neither rising nor falling. The lecturer, comparing it with a 'screw' propeller, explained that if several of the latter were placed horizontally and in line with each other, they would suck the air from, and interfere with the lift of, one another, whereas with the propeller he has invented the reverse takes place, as they drive the air towards each other. The energy taken to lift 12½ lbs. vertically, and maintain it in the air, was 0.4-h.p., and the revs. per min. only 53. He then showed how an entirely new kind of machine, which he calls the 'Aerocar,' would be built. Imagine a car 2 ft. wide (containing the pilot and engines) with four propellers—that is, two on each side—and one got a good idea of an 'Aerocar.' Each of these propellers would be 8 ft. in width and 8 ft. in diameter—together equal to sixteen times the width of the one upon which the tests were made, which was only 2 ft. in width. Therefore, with sixteen times 12½ lbs. and sixteen times 0.4-h.p., the lift or thrust was 200 lbs. from 6.4-h.p. (at 53 revs. per min.).

"When the 'Aerocar' has risen sufficiently some of the power may be diverted forwards, or even backwards, without reversing the propellers or motor. The above-named tests and figures were verified before the audience by some of the engineering staff of the school."

Instead of entering upon a theoretical discussion I prefer to give the foregoing facts, for, after all, the only practical test is "What does it lift per horse-power?" The propeller from which these facts were obtained contained 25 sq. ft. of planes.

I should now like to know whether by any other existing means the same result can be obtained, viz., 200 lbs. vertical lift from 6.4-h.p. at 53 revs. per min., and with 400 sq. ft. of planes, the total dimensions not to exceed 27 ft. by 20 ft.

I have carefully perused the Babilot patent specification, and although at first glance our respective inventions do appear to be similar, the details vary greatly, and I think in my favour.

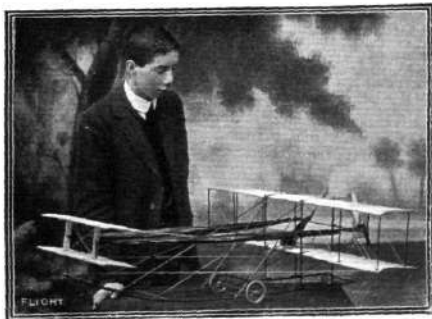
Prestwich Park.

JOSEPH CLARKSON.

MODELS.

Model Biplane.

[1235] I enclose a photo of my latest model. The whole of the framework is of birch. The wheels are lightly sprung by elastic, which allows the full shock to be borne by the skids in the event of a rather heavy landing, a principle which has often been urged in

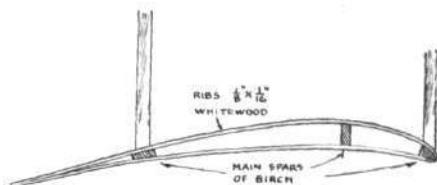


FLIGHT. The main planes are built up as shown in the accompanying sketch, the ribs being nailed and glued to the three main spars of birch. Angle of inclination of the main planes is 33°. The elevator is single-surfaced and controlled by a universal lever on the Farman principle. The two propellers, 12 ins. diameter and 33 ins. pitch, are carved from laminated satin walnut. It was one day's work to carve the propellers, but I was amply repaid by the appearance when finished. There are two skeins, each of

16 strands, connected by gear-wheels, to drive each propeller. When wound to 200 turns, the propellers run for about 15 secs., at an average speed of 800 r.p.m.

The chief dimensions are: Span, 40 ins.; chord, 6½ ins.; length, 40 ins.; elevator, 20 ins. by 4 ins.; weight, 24 ozs.

Since the photo was taken I have dispensed with the rear rudder, as it was always getting damaged, and I have also fitted ailerons between the main planes. I have not been able to fly the machine



much owing to our excellent climate. At the third attempt, however, it went 40 ft., the flight being brought to a close through one of the propellers getting caught.

In spite of its somewhat heavy weight it is remarkably buoyant. If launched too much into the air it mounts up some 10 ft., coming down, unfortunately, with a "tail-slide."

I may mention that, with the exception of wheels and wire-strainers, everything is my own construction.

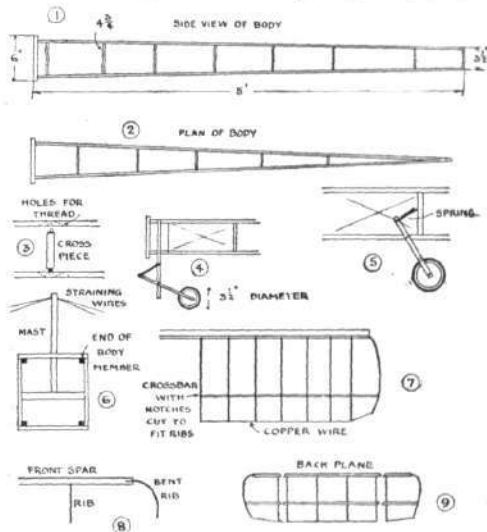
Palmer Green.

E. R. BROWN.

Model Blériot.

[1236] The following is a description of a model Blériot monoplane I made a short time ago. It cost me altogether about 7s. If you think it would interest your readers I should be much obliged if you would find room to insert it in FLIGHT.

I first obtained a plank of white wood 5 ft. by 9 ins. by ½ in., this



cost 1s. 3d. I then cut four 5 ft. lengths, ½ in. section, these were put together as in Figs. 1, 2, and 3. I have put the lengths of the cross bars by the side of each figure, they are ½ in. section. The front landing chassis may be seen in Fig. 4. The two movable pieces are joined together about 2 ins. from their lower extremity by a cross-bar. The back wheel may be seen in Fig. 5. The wings are made of umbrella ribs. There are eight ribs in each wing, and they are 13 ins. long; they are bent to required camber, and then forced into holes in the front bar, Figs. 7 and 8. Each front bar is 2 ft. 6 ins. long. The ribs are then bound into notches in the second bar, and copper wire is threaded through the holes at the end of the ribs. The back planes are made on the same principle as the front ones, and may be seen in Fig. 9. The four main-bars of the fuselage are joined together in front by a square, Fig. 6. This also shows the mast, which should be let

through the top bar and a short way into the middle one. It has a 14 in. wood propeller cut from a block of deal. The following is a summary of articles required:—White wood, 11. 3d.; calico, two yards at 7½d. per yard, 11. 3d.; wheels, 3s. 5d.; propeller wood, 3d.; thread (very thick) for straining wire, 1d.; thin copper wire, 2d.; springs, 2d.; sundries, 5d.

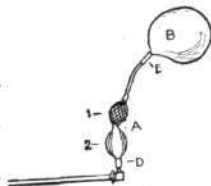
"HORLEY."

Inflating Model Balloons.

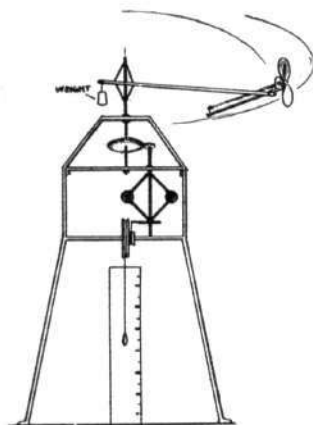
[1237] Perhaps some of your readers will find the following device useful for inflating rubber balloons, which has to be done under pressure from a gas jet. A pair of spray balls, A, are connected to the gas pipe, C, by means of a piece of rubber tube, D, and the balloon, B, is connected to the tube leading from the spray by a piece of glass tube, E. All the air is forced out of the balls and then the gas is turned on. By pressing ball No. 2, the gas is forced into the balloon, which, when full, causes No. 1 to swell. The mouth of the balloon is then tied up and disconnected from the glass tube.

East Kirkby.

LESLIE WAGGOTT.



Testing Model Propellers.



Dorking.

[1238] I noticed in FLIGHT for January 12th (letter No. 1019), that somebody has at last constructed a simple apparatus for testing model propellers, but as you pointed out he has no means of comparing his results. I think the following apparatus would, however, show the efficiency of various propellers. A combination of Mr. F. Law's apparatus and Mr. G. N. Philips's (No. 814), FLIGHT No. 94. When four or five propellers have to be tested, the one with the greatest thrust could be found with this apparatus.

J. F. BARGMAN.

AEROPLANE SYSTEMS (TO SCALE) ALREADY PUBLISHED IN "FLIGHT."

Antoinette	Oct. 23, 1909	Mayfly	Dec. 17, 1910
Avis	Mar. 30, 1910	Maxim	Apr. 30, "
Baldwin	Sep. 10, "	Neale	Oct. 8, "
Blériot No. XI.	July 31, 1909	Paulhan	Oct. 22, "
" 2bis	Dec. 31, 1910	Pittner	Mar. 12, "
Bristol	Mar. 18, 1911	Piggott	May 21, "
Cody	Aug. 21, 1909	Pilcher Glider	Jan. 1, "
"	Nov. 12, 1910	"	8, "
"	19, "	Rucker-Edwards	Feb. 5, "
Curtiss	July 3, 1909	Sanders	Mar. 4, 1911
Dunne	June 18, 1910	Santos-Dumont's	"
"	25, "	"	"
Farman (Henry)	Oct. 16, 1909	"	"
Grade	Dec. 11, "	Short	Mar. 19, 1910
Grahame-White	"	"	26, "
" New Baby "	Mar. 25, 1911	"	April 2, "
Hanriot	Dec. 3, 1910	"	June 10, 1911
Havilland (de)	April 9, "	Somerville	Mar. 11, "
"	16, "	Valkyrie	Oct. 1, 1910
Herring-Burgess	23, "	Voisin	Aug. 14, 1909
Lilienthal Glider	Jan. 1, "	"	21, "
"	8, "	Weiss	June 17, 1911
Macfie	Mar. 5, "	Wright Glider	Sep. 18, 1909
"	12, "	"	"
Martin-Handasyde	Mar. 25, 1911	Biplane	Mar. 12, 1910

FLIGHT PIONEERS ALREADY PUBLISHED.

Astley, H. J. D.	Mar. 25, 1911	Ladougue, E.	Oct. 15, 1910
Barnes, G. A.	Sep. 24, 1910	Lorraine, Robert	Sept. 17, "
Boyle, Hon. Alan	July 23, "	Maxim, Sir Hiram	Mar. 12, "
Clement, Mons. A.	Oct. 22, "	McArdle, W. E.	Nov. 26, "
Cody, S. F.	Sep. 18, 1909	McClean, F.	Dec. 18, 1909
Colmore, G. C.	Dec. 10, 1910	Moisant, John B.	Aug. 27, 1910
Conner, Lieut.	"	Moore-Brabazon	Nov. 6, 1909
D. G.	Mar. 4, 1911	Morison, O. C.	Jan. 21, 1911
Dickson, Capt. B.	July 16, 1910	Ogilvie, Alec	Sept. 10, 1910
Drexel, J. A.	30, "	Paulhan, Louis	Jan. 22, "
Ducrocq, Maurice	April 29, 1911	Pixton, C. H.	May 6, 1911
Dunne, J. W.	Sep. 3, 1910	Prier, Pierre	April 22, "
Farman, Henry	Feb. 12, "	Radley, James	Aug. 20, 1910
Gibbs Lancelot D.	Aug. 13, "	Roe, A. V.	Jan. 29, "
Gilmour, D. Gra-	"	Rolls, Hon. C. S.	Nov. 13, 1909
ham	Oct. 29, "	Singer, Mortimer	Jan. 15, 1910
Grace, Cecil	July 9, "	Sopwith, T. O. M.	Dec. 3, "
Grahame-White,	"	Wallace, Roger W.	Jan. 1, "
C.	April 30, "	Watkins, Lieut.	"
Greswell, C. H.	Feb. 25, 1911	H. E.	Feb. 4, 1911
Hamel, G.	April 1, "	Wood, Capt. H. F.	Feb. 18, "

Applications for the above full series, or singly, should be made to the PUBLISHERS, 44, St. Martin's Lane, W.C.

NEW COMPANY REGISTERED.

Air Stations (Dover), Ltd.—Capital £5,000, in £1 shares. Proprietors of aviation grounds, teachers of aviation, organisers of races, dealers in and letters on hire of aeroplanes, &c. Under agreement with A. I. R. (Aviation Investment and Research), Ltd. First directors, F. G. Macgregor and G. B. Miller.

Aeronautical Patents Published.

Applied for in 1910.

9,544.	C. W. PAUL. Flying machines.
13,990.	F. H. VARLEY. Aerial machines.
13,331.	A. WOLFMULLER. Flying machine.
25,730.	L. SOMMER. Flying machines.
26,104.	G. MITCHELL. Aerial navigation.

Applied for in 1911.

886.	STUHLER. Airship frames.
------	--------------------------

DIARY OF COMING EVENTS.

British General Events.

July 1	Gordon-Bennett Aviation Cup Contest.
July 22-Aug. 5	Daily Mail Round England Contest.
Oct. 31	Close of British Michelin Cup.

Foreign Fixtures.

June 18-29	European Circuit—Paris, Brussels, London, Paris.
July 11	Paris—Bordeaux—Paris.
July	Italian Circuit.
July 1-13	Circuit Berlin—Hannover—Hamburg

PRINCIPAL CONTENTS.

	PAGE
Misapprehension and its Danger	540
Portrait—Mr. James Valentine	541
The Dunne Monoplane. (Illustrated.)	542
Aero Models Association	545
Report of Advisory Committee on Aeronautics	546
Royal Aero Club Notes	548
Progress of Flight about the Country	549
From the British Flying Grounds	550
School Aero Club Notes	551
New Army Biplane. Testing Fabric	552
British Notes of the Week	553
Foreign Aviation News	554
European Circuit	555
Experiments at Rajputana	557
Correspondence	558

FLIGHT.

44, ST. MARTIN'S LANE, LONDON, W.C.

Telegraphic address: Truditor, London. Telephone: 1828 Gerrard.

SUBSCRIPTION RATES.

FLIGHT will be forwarded, post free, to any part of the world at the following rates:—

UNITED KINGDOM.	s. d.	ABROAD.	s. d.
3 Months, Post Free	1 8	3 Months, Post Free	2 9
6 " "	3 3	6 " "	5 6
12 " "	6 6	12 " "	11 6

Cheques and Post Office Orders should be made payable to the Proprietors of FLIGHT, 44, St. Martin's Lane, W.C., and crossed London and County Bank, otherwise no responsibility will be accepted.